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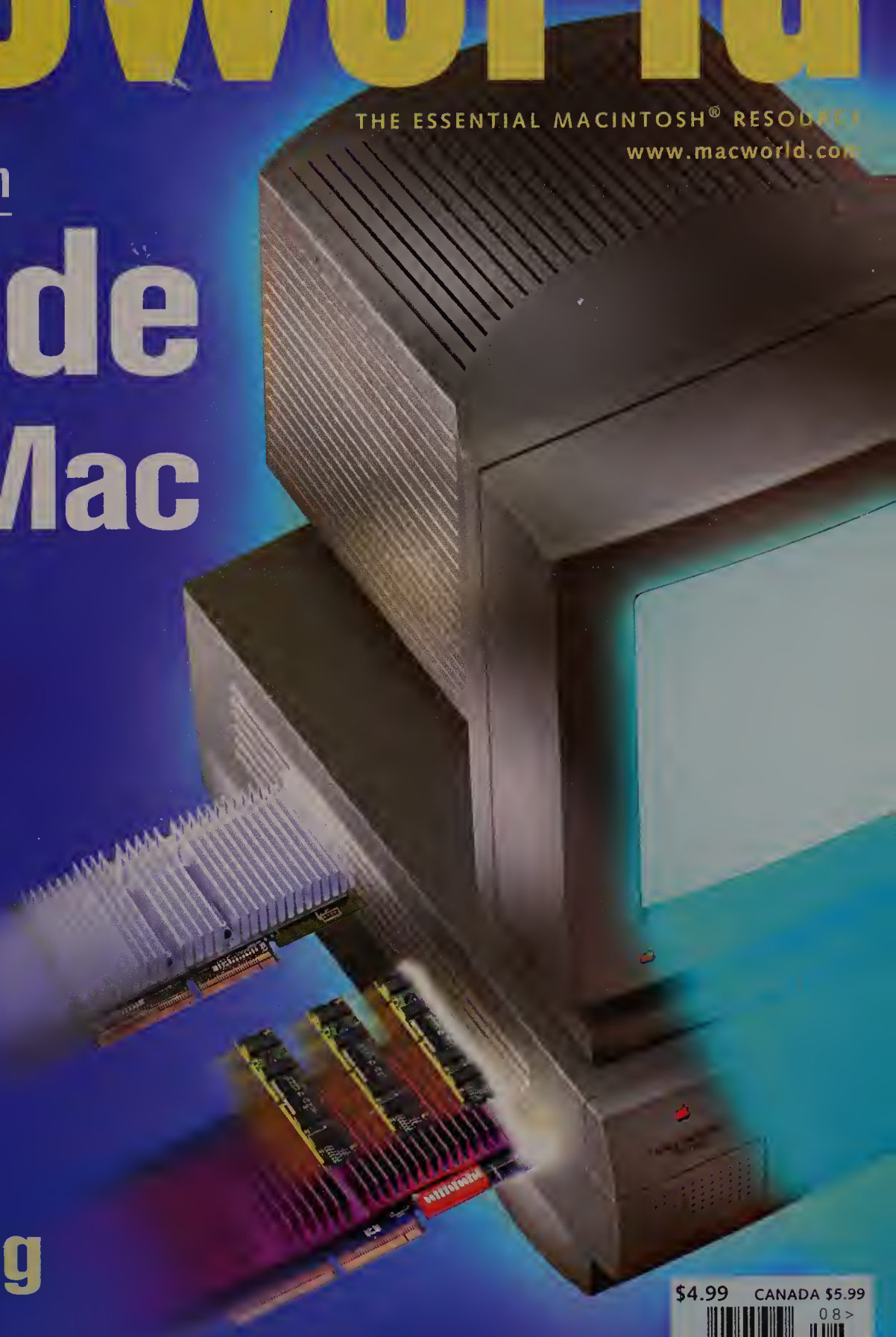

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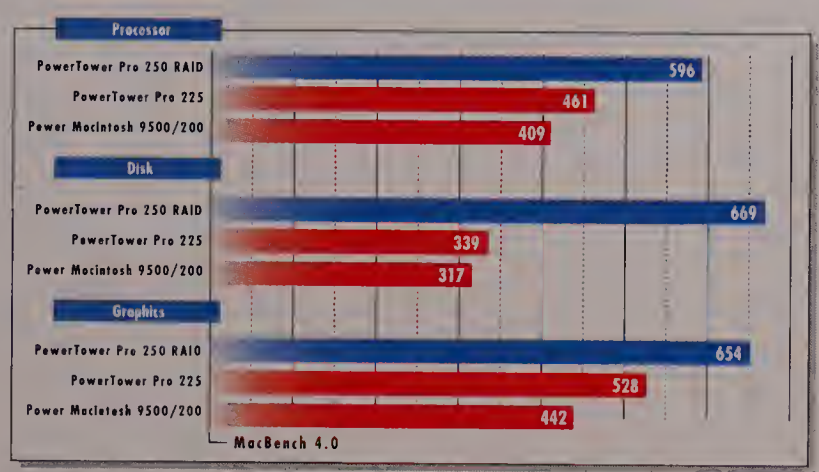

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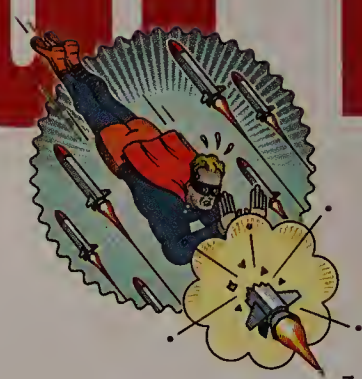

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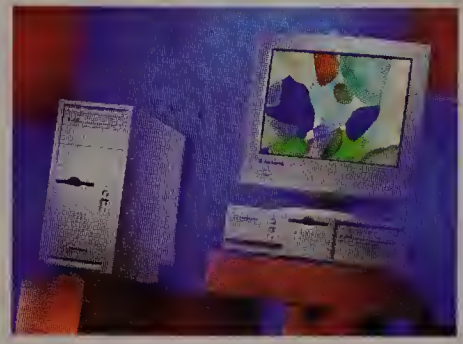

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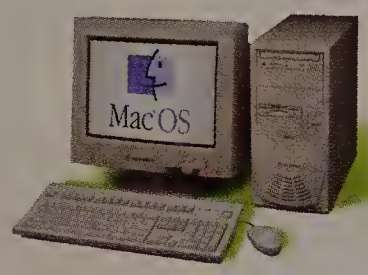

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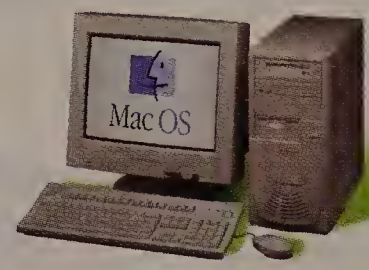

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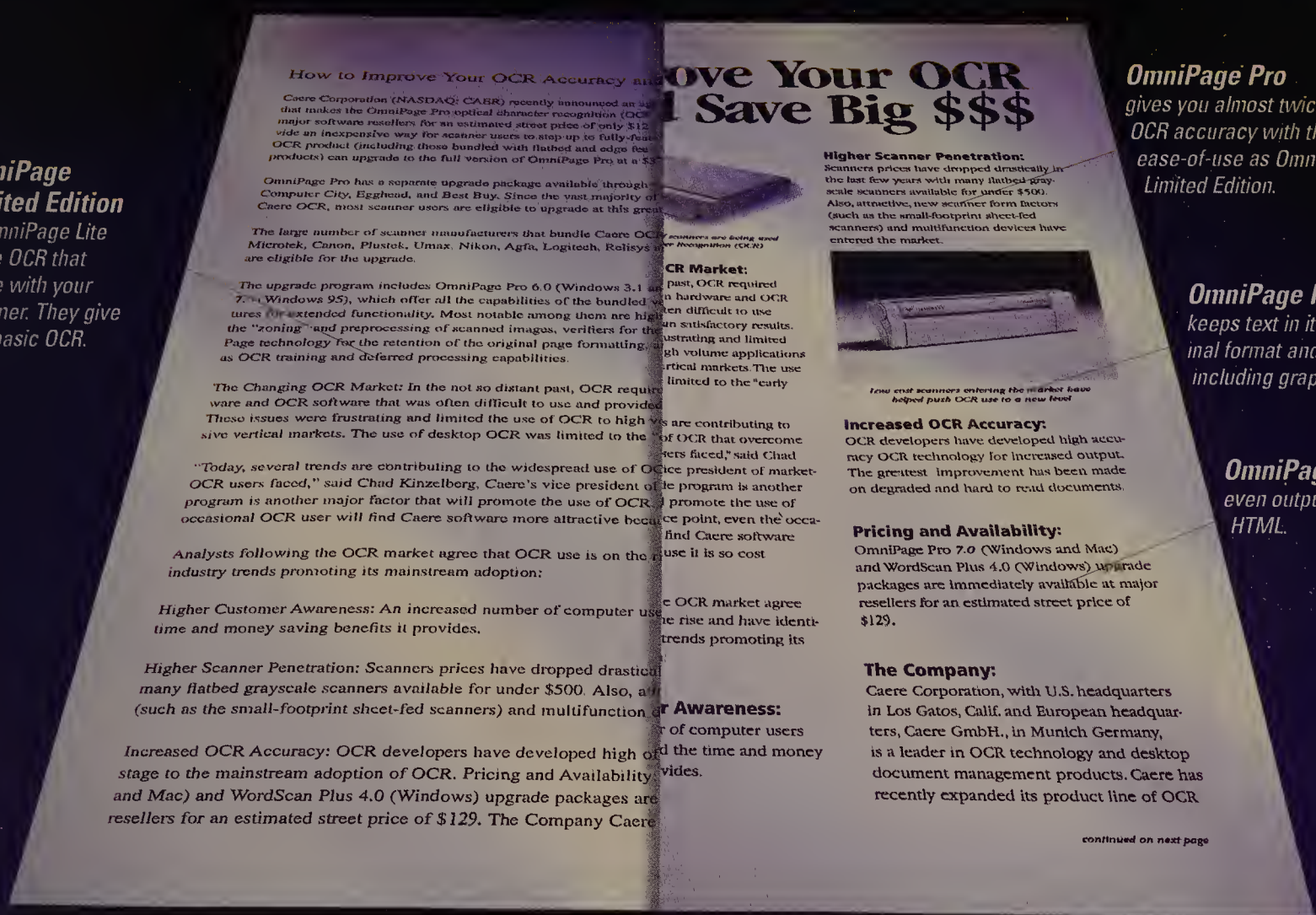
New OmniPage Pro 7.0 gives you the recognition you deserve.

OmniPage Limited Edition *or OmniPage Lite is the OCR that came with your scanner. They give you basic OCR.*



How to Improve Your OCR Accuracy an

Caere Corporation (NASDAQ: CAER) recently announced an a
that makes the OmniPage Pro optical character recognition (OC
major software resellers for an estimated street price of only $12
vide an inexpensive way for scanner users to step up to fully-fea
OCR product (including those bundled with flatbed and edge fee
products) can upgrade to the full version of OmniPage Pro at a $5

OmniPage Pro has a separate upgrade package available through
Computer City, Egghead, and Best Buy. Since the vast majority of
Caere OCR, most scanner users are eligible to upgrade at this great

The large number of scanner manufacturers that bundle Caere OC
Microtek, Canon, Plustek, Umax, Nikon, Agfa, Logitech, Relisys a
are eligible for the upgrade.

The upgrade program includes OmniPage Pro 6.0 (Windows 3.1 a
7.0 Windows 95), which offer all the capabilities of the bundled ve
tures (or extended functionality. Most notable among them are high
the "zoning" and preprocessing of scanned images, verifiers for the
Page technology for the retention of the original page formatting, a
as OCR training and deferred processing capabilities.

The Changing OCR Market: In the not so distant past, OCR requir
ware and OCR software that was often difficult to use and provided
These issues were frustrating and limited the use of OCR to high v
sive vertical markets. The use of desktop OCR was limited to the

"Today, several trends are contributing to the widespread use of OC
OCR users faced," said Chad Kinzelberg, Caere's vice president of
program is another major factor that will promote the use of OCR.
occasional OCR user will find Caere software more attractive becau

Analysts following the OCR market agree that OCR use is on the r
industry trends promoting its mainstream adoption:

Higher Customer Awareness: An increased number of computer use
time and money saving benefits it provides.

Higher Scanner Penetration: Scanners prices have dropped drastical
many flatbed grayscale scanners available for under $500. Also, a
(such as the small-footprint sheet-fed scanners) and multifunction d

Increased OCR Accuracy: OCR developers have developed high o
stage to the mainstream adoption of OCR. Pricing and Availability
and Mac) and WordScan Plus 4.0 (Windows) upgrade packages are
resellers for an estimated street price of $129. The Company Caere

ove Your OCR
l Save Big $$$

scanners are being used
ce Recognition (OCR)

CR Market:
past, OCR required
n hardware and OCR
ten difficult to use
un satisfactory results.
ustrating and limited
gh volume applications
rtical markets. The use
limited to the "early

s are contributing to
of OCR that overcome
sers faced," said Chad
ice president of market-
le program is another
promote the use of
ce point, even the occa-
find Caere software
use it is so cost

e OCR market agree
e rise and have identi-
trends promoting its

r Awareness:
r of computer users
d the time and money
vides.

Higher Scanner Penetration:
Scanners prices have dropped drastically in the last few years with many flatbed gray-scale scanners available for under $500. Also, attractive, new scanner form factors (such as the small-footprint sheet-fed scanners) and multifunction devices have entered the market.

Low cost scanners entering the market have helped push OCR use to a new level

Increased OCR Accuracy:
OCR developers have developed high accuracy OCR technology for increased output. The greatest improvement has been made on degraded and hard to read documents.

Pricing and Availability:
OmniPage Pro 7.0 (Windows and Mac) and WordScan Plus 4.0 (Windows) upgrade packages are immediately available at major resellers for an estimated street price of $129.

The Company:
Caere Corporation, with U.S. headquarters in Los Gatos, Calif. and European headquarters, Caere GmbH., in Munich Germany, is a leader in OCR technology and desktop document management products. Caere has recently expanded its product line of OCR

continued on next page

OmniPage Pro *gives you almost twice the OCR accuracy with the same ease-of-use as OmniPage Limited Edition.*

OmniPage Pro *keeps text in its original format and layout, including graphics.*

OmniPage Pro *even outputs to HTML.*

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Sure, the OmniPage Limited Edition OCR that came with your scanner is good. In fact, that's why scanner makers like HP, Microtek and Agfa chose it above all others.

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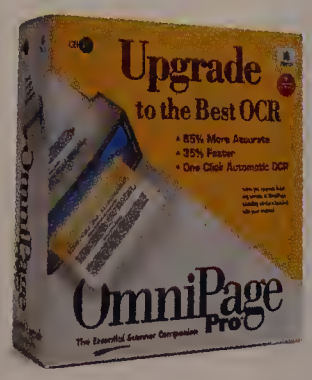

It integrates seamlessly with your favorite applications like Word, ClarisWorks and more. It even guides you through the OCR process using its AutoOCR Toolbar. All with the simple push of a button.

What's more, you get the advantages of the world's most popular OCR software without learning an entirely new program. So make sure you're getting all the OCR power and accuracy you deserve. Call now to upgrade, or visit a local reseller.

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Key Feature Comparison	OmniPage Pro	OmniPage Limited Edition
Caere's fastest and most accurate OCR engine	✔	
AutoOCR Toolbar™ for easy, one-button OCR processing	✔	
Apple Guide gives you on-screen interactive help	✔	
Preserves graphics in output text	✔	
OCR from within your favorite applications	✔	✔
Retains original layout	✔	

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The Mac OS Report

Number two in a series—the facts about Mac OS 8

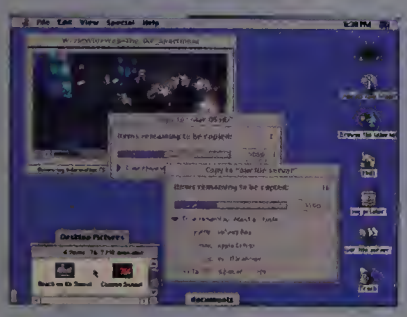
Mac® OS 8 is coming. It will give you, and millions of other Macintosh® users, a whole new way of working.

It will give your Apple® Macintosh computer (or, for that matter, any other Mac OS computer of your choice) a dramatic new look and feel, along with all kinds of enhanced capabilities for accessing the Internet.

It will also set an entirely new standard of powerful, intuitive computing — a standard the competition can try to catch up to. (Again.)

A new way of working

The moment you start using Mac OS 8, you'll feel the difference: you'll find yourself accomplishing more in less time. A multi-threaded Finder™ lets you execute multiple tasks simultaneously, such as launching applications and copying files. Mac OS 8 includes new information-management tools, such as contextual pop-up menus and spring-loaded folders, that give you quicker and easier access to all your information. A scalable environment lets you either limit your menu and window options, or expand them—whichever works better for you. A new, dimensional look makes the interface more dynamic and engaging than ever. And Mac OS 8 also includes the latest versions of QuickTime® with its MPEG support, QuickTime VR and QuickDraw® 3D.

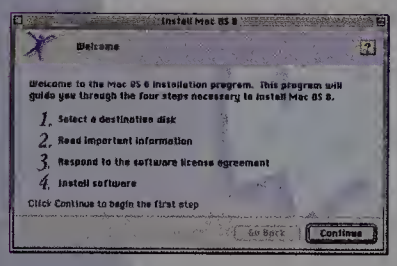


How easy is it to get going with all these new technologies and features? Very. Because our new installer and setup assistants take you through each step of configuring your new system software. Once you're up and running, PowerPC™-native code improves your performance. Mac OS 8 is also completely compatible with all PowerPC and 68040-based hardware and software.

A new way of accessing the Internet

Mac OS 8 includes TCP/IP and PPP for easy network or modem access direct from the Finder. You get Netscape Navigator™ and the PointCast Network.™ And a new Internet Setup Assistant makes it easier than ever to get on the Net, whether you're doing it from home with a modem or from work with a high-speed connection.

Personal web sharing is standard, so you can turn any Macintosh into an Internet web server. And Java™ support is built in, so you can run Java applications just as though they were any other desktop applications. (If you were wondering, Windows® 95 can't do this.)



And more advancements are on the way

Mac OS 8 is one of the most significant advances in OS technology ever. And it's just the beginning—additional upgrades are planned. And our support for the Mac OS will continue for years.

At the same time, we're also working on an industrial-strength OS, code-named Rhapsody, that will offer features such as protected memory, preemptive multitasking and symmetric multiprocessing. Rhapsody will also provide backwards compatibility, so you can be sure that the vast majority of your Mac OS apps will run on Rhapsody, too.

In other words: Apple is still developing the most innovative, user-friendly and consistently superior products on the market. That's one part of our system that won't change. To learn more, visit www.macos.apple.com.

If you want to use Netscape Navigator to browse the Net, you'll like this: it's an integrated part of Mac OS 8.

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It's the PointCast Network. It comes with Mac OS 8. And it grabs the news you want directly off the Net to create customized desktop news pages. Daily. Hourly. As often as you want.

When you get Mac OS 8, you also get built-in Java support, so you can run both local and network-based Java software just like other desktop applications.

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Mac OS has always been the easiest and most intuitive of all operating systems. Now, Mac OS 8 brings this kind of computing to a whole new level.

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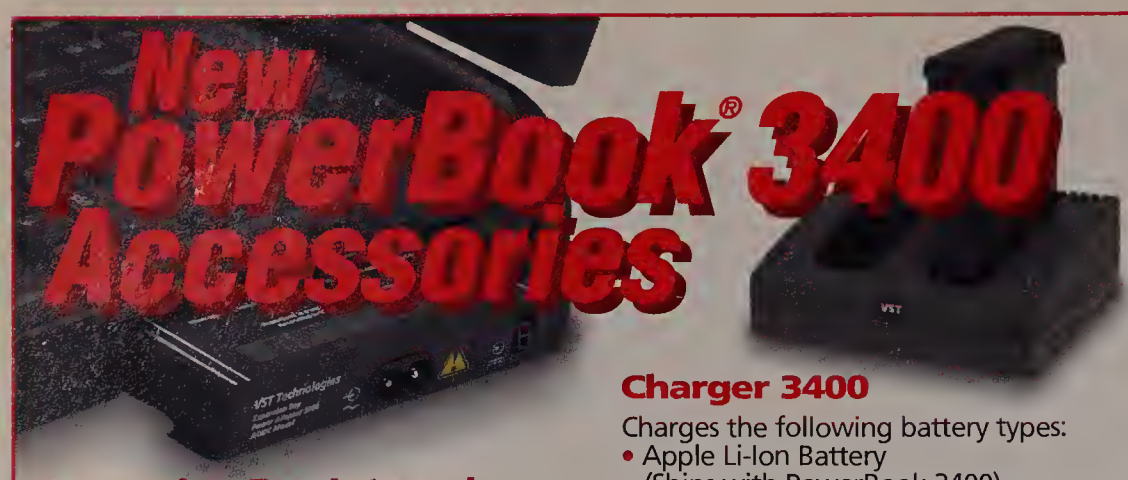

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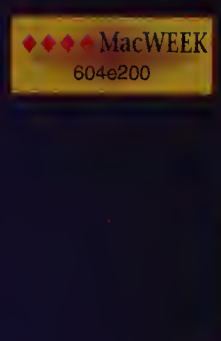

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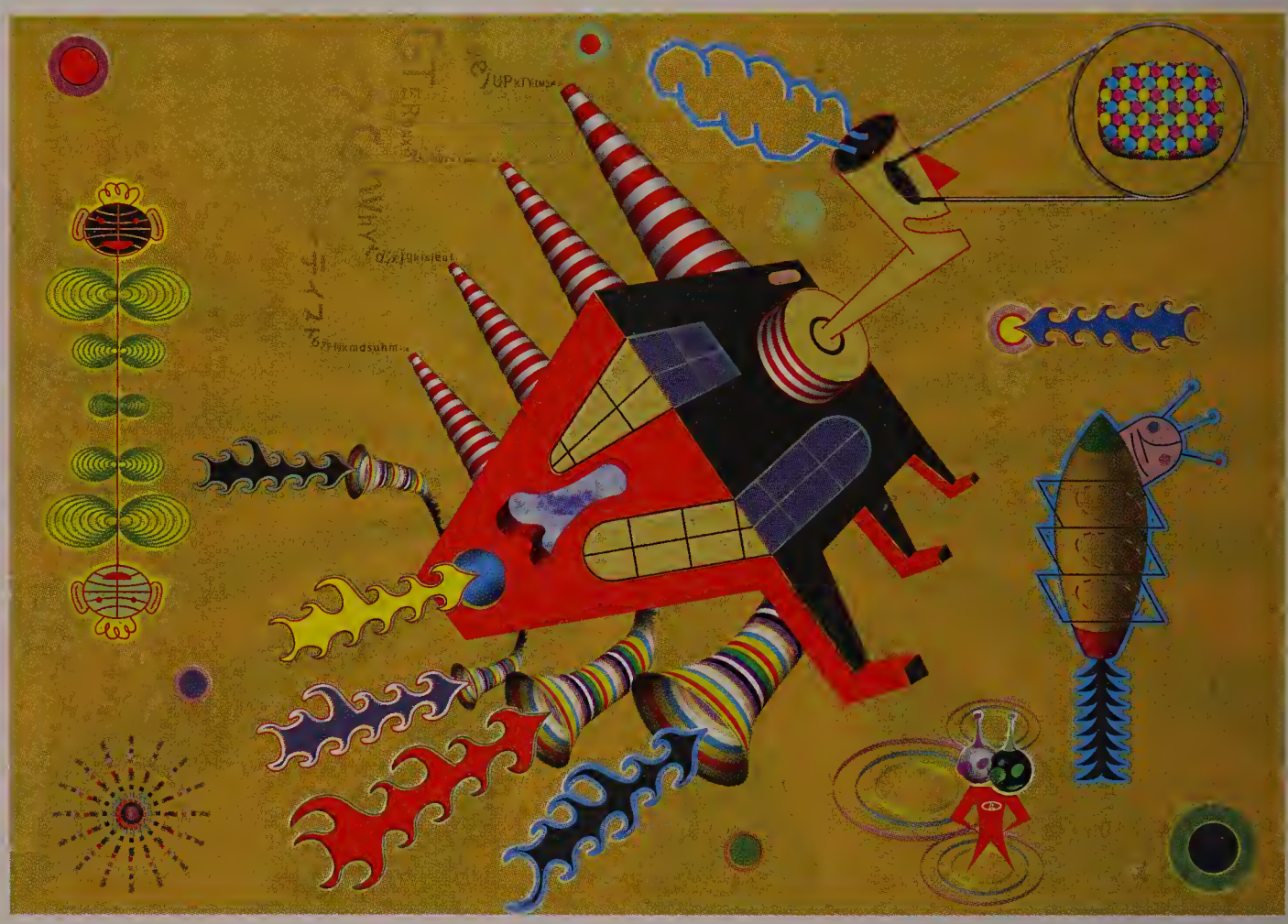

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AUGUST 1997

Letters

In Spite of Everything, Apple's Still Great

IT SEEMS TO ME THAT MANY MACINtosh people are turning away, forecasting bad times ahead, and helping the press with its ubiquitous anti-Apple propaganda. I've been in the Macintosh world since its birth, and I can honestly say that the future of the Mac is looking brighter than ever. Really.

Licensing is beginning to show its value; the Common Hardware Reference Platform promises powerful computers at bargain prices; the Motorola G3 processor brings speed to a whole new level, and there's Tempo and the granddaddy of them all, Rhapsody!

Apple has acquired the best of all operating systems, and it's going to make it better. Rhapsody is going to sell—big-time. With the new, redesigned Apple (think of it as Apple 2.0), I sometimes can't believe how promising the future looks. I'm very excited, and I think any Macintosh user should be as well. I don't blame Larry Ellison or the prince for wanting to buy Apple—I would.

JASON TYREE
Turlock, California

Have Tool Belt, Will Compute

YOU SHOULD INFORM YOUR READERS that PowerTools has terrible tech support and leave it at that ("Mac License Raises Questions," *News*, May 1997). If the Mac OS is going to compete at all levels with the Wintel world, there has to be a place for Mac OS products that are absolutely rock bottom in price. There is a large PC market at computer shows and through small computer stores that only sells PC parts with no tech support. There needs to be a Mac OS outlet for

"do-it-yourself" buyers, and it seems that PowerTools is the first company to address this market.

BRUCE ANSELMO
Ventura, California

The DTP Battle Rages On

I HAVE TO DISAGREE WITH YOUR REview of Adobe PageMaker 6.5 (*Reviews*, May 1997).

First, I switched from QuarkXPress to PageMaker because PageMaker runs so much more smoothly, has better color support, and has a much nicer interface that is more conducive to working on large catalogs (what I do) or on small one- or two-page ads. It is reliable—something I cannot say of QuarkXPress—can export the graphics within it, and produces excellent output.

I like PageMaker's implementation of frames. It meshes perfectly with the program's free-form tools. It would be nice to have automatically flowing columns using frames, but that is a minor inconvenience compared with the power of PageMaker's version of frames and the ability to have free-form text and graphics.

Finally, although there are weaknesses in the HTML exporting features of PageMaker, that is not the program's main feature.

ALEX KAC
Austin, Texas

I AGREE WITH YOUR STATEMENT, "PAGEMaker hasn't even caught up with—much less surpassed—XPress." To add to that: in graphic design I try to ask the question, "What does the guy at the end of production need?" Until the folks at the film house ask me for PageMaker files, I'm going to stick with QuarkXPress. People who make film for a living have a nickname for PageMaker: PainMaker. Ease-of-use benefits won't make up for the dirty looks you'll get from your local film house.

DARYL CHING
Torrance, California

Macworld Online Has the Answers

WHAT IS HAPPENING TO PRINTED material in regard to computers? Computer-related information is changing at a pace that vastly exceeds the time it takes to publish a magazine in print.

Look back to 1995 and earlier, when we were lucky if we got a new set of Macs once a year. Now we see two or three new systems every month. Now think about software: new versions every year or six months, with thousands of titles. In many cases, computer books are obsolete by the time they hit the shelves.

continues

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CORRECTIONS

- *In Adobe Illustrator 7, ⌘-control-U still cycles the unit of measure, as it has done in previous versions of the program ("Illustrator's New Face," June 1997).*
- *The chart "Subnotebook Keeps Pace with 3400c" (News, July 1997) incorrectly stated that the PowerBook 1400c/133 was a prototype system and not yet shipping. The system was shipping at the time, and we used a shipping model in our tests.*

I do not discount printed media. In fact, I buy three to five new books every week in many topic areas. Nor do I blame the publishers or even feel a bit of malice toward them. I too am a proud owner of a *Macworld* subscription, and I wouldn't give it up. I only question the direction of printed media.

AARON CLOUTIER
Rochester, New York

It's true that the industry is moving at breakneck speed, and it just keeps getting faster. Whether you're a consumer or work in the industry, it's hard to keep up. This is why Macworld Online (www.macworld.com) *includes breaking news coverage on products, the industry, and computing trends, all updated on a daily basis. In addition, you'll find a wealth of shareware in our Software Collection, past issues of the magazine, detailed hardware and software information in the Buyer's Guide, and special Macworld Online feature stories covering Internet issues.—Ed.*

Storage-Solution Savings

I UNDERSTAND HOW SOMEONE WHOSE livelihood depends on Macs may have a siege mentality when it comes to the PC world. But in the PC world at least, the EIDE bus allows you to attach four storage devices, not just two ("Increase Your Storage," May 1997). If one of those devices is a CD-ROM drive, so much the better; why waste a SCSI address on something that is primarily used to load software? Also, since I have to buy my own hard drives, I'm willing to give up 4 MBps to get the same capacity for a fraction of the price.

While a 4.3GB drive is plenty for me, if you really need a 9.0GB drive for $1670, you can add it to the SCSI bus which is "still built into all Macs." And if you're talking about PCs, remember, SCSI cards are available for them, too, so you can add scanners, removable-storage devices, tape drives, and the like without using up two SCSI addresses.

Just as the PC world learned from the world of Macintosh, the Macintosh world can learn some things from the PC world (and save some money).

ROB WALLACE
Belchertown, Massachusetts

You're right, EIDE can take four devices, but it can't do it out of the box. Each EIDE controller can support only two devices. PCs that take four devices have special cards with dual-channel controllers on board. Macs can't use this kind of card. Therefore, you have to add a PCI card with a second controller to support four devices. These controllers are relatively inexpensive—some under $100—but as we said before, when you're looking at any factor except cost, SCSI is a better bet than EIDE.—Ed.

Seeing Double

THE PROMISE OF ACCELERATED NETwork file-transfer speeds was the main reason I bought the Speed Doubler 2 upgrade (*Reviews*, May 1997). I bought it before I read any reviews, so I wasn't too surprised when I learned of an oversight on my part: you must first upgrade to RAM Doubler 2 in order to enjoy the network file-transfer speed increase that comes with Speed Doubler 2. Of course, this doesn't become apparent until you restart the machine after selecting the network speed-increase option. Bummer!

STEVE SCOVILLE
Encinitas, California

Don't be too bummed. You're right that if you're using both programs, you need the RAM Doubler 2.0.1 upgrade to take advantage of Speed Doubler 2's new networking speed increase. And you're also right that this isn't mentioned in the Speed Doubler 2 documentation, including the Read Me file. However, you do not have to have RAM Doubler installed to enjoy faster network copying. The reviewer did not use RAM Doubler; nor was it used during Macworld Lab's testing. What you're experiencing is strictly a compatibility issue that relates to one specific program. To fix it, you can download the RAM Doubler 2.0.1 updater from Connectix's Web site (www.connectix.com).*—Ed.*

continues

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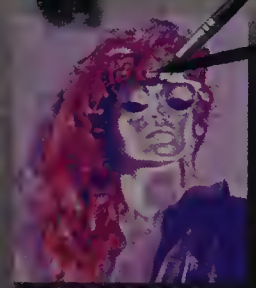
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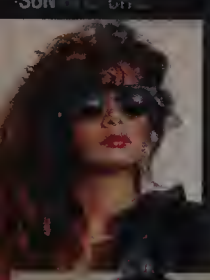
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What We Need for DVD

THAT WAS AN INTRIGUING ARTICLE about DVD drives for the Mac ("DVD Drives Coming to the Mac Market," *News*, May 1997). The article states, "MPEG-2 software decoding should be available within a year. . . . However, only a high-powered computer—200MHz or faster—can do it."

Can I assume that a 200MHz 603e-equipped PowerPC is powerful enough, or would that be exclusively a 604e-equipped PowerPC? If the 200MHz 603e is fast enough, is a 180MHz 604e fast enough also, since in reality their performances are similar?

CRAIG LARSON
Seattle, Washington

A good point. The problem is that until the software is written and optimized, no one can be certain what level of processor will be necessary. The decompression process is scalable; a slow processor may be able to do it, but not as well as a fast processor. What's acceptable will be up to the eyes of the beholder; 200MHz is merely a rough guideline.—Cary Lu

Pointed Words on Pins

I ENJOYED THE ARTICLE "NEW POWERPC CPU: A Step Ahead" very much (*News*, May 1997).

One comment, though. When I was at Motorola, a "pinout" was the description of a connector's function (power, ground, gate, and so on), usually as an engineering document or graphic. Things may have changed, but back then we called the actual connectors "pins."

I was kit program coordinator for the MEK6800D2 (the predecessor of the Motorola 68000 used in the Lisa and Macintosh) and a senior technical graphics editor, so I did a lot of the pinout graphics for the manuals.

BILL CAWTHON
Houston, Texas

MMX versus PowerPC

I JUST READ PATRICK TAYLOR'S LETTER regarding why the MMX isn't really a threat (*Letters*, May 1997). What Mr. Taylor doesn't seem to understand is that what matters to average users is how well their computers work on a daily basis. Who cares if the MMX relies on a bigger cache, or if the PowerPC still has 680X0 instructions, or what the difference in bus speeds is? That doesn't make users feel better when the machine is crashing or lagging, or when they can't multitask without bringing the computer to a grinding halt.

Why not admit that Apple and the Macintosh could use some work, rather than quibble about factors that are ultimately negligible?

I love the Mac and would like nothing more than its reemergence as the state-of-the-art machine, so it is a bit disconcerting when Macintosh users, like Apple itself, appear smug about its capabilities rather than its possibilities.

BRYAN Y. LIM
New York, New York

Macworld "Friends" in High Places

I SAW MATTHEW PERRY (CHANDLER Bing on NBC's *Friends*) reading the March issue of *Macworld* on Thursday, March 26. Brilliant! Now everybody in my age group knows how cool it is to read *Macworld* and to use Macs. Using the Mac is just a hobby for me, but what a trendy one it is!

PAUL WOODFORD
Saint Charles, Missouri

What age group are you referring to that defines coolness by a half-hour sitcom, anyway? Oh, that's right: the 8-to-65 group.

Actually, we were just as excited as you were to see the spot, and a QuickTime movie of the scene was e-mailed around the office for those who missed the show. We'd like to take some responsibility for it, but someone at NBC—whether it was Matthew Perry, another cast member, or a staff person—did this of his or her own accord. Personally, I like to think it was Jennifer Aniston's idea, and that she's a Mac fanatic. Regardless, it was cool, indeed.—Ed. m

Letters should be sent to *Letters*, Macworld, 501 Second St., San Francisco, CA 94107; via fax, 415/442-0766; or electronically to CompuServe *(70370,702)*, MCI Mail *(294-8078)*, America Online (keyword *Macworld*), AppleLink *(Macworld1)*, or via the Internet *(letters@macworld.com)*. Include return address and daytime phone number. Due to the high volume of mail received, we can't respond personally to each letter. We reserve the right to edit all letters. All published letters become the property of *Macworld*.

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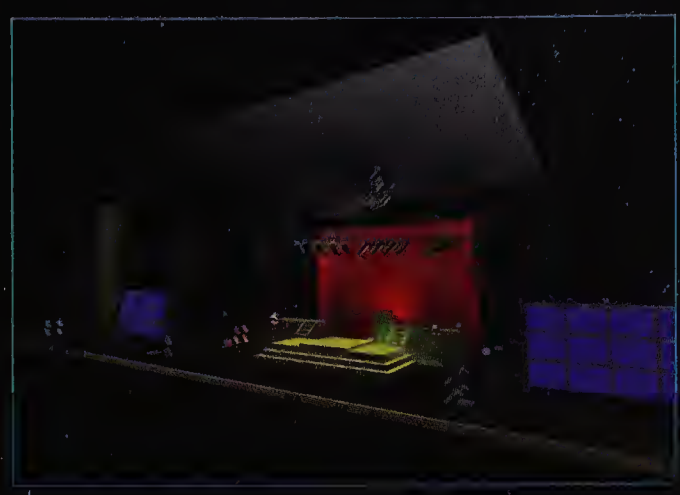

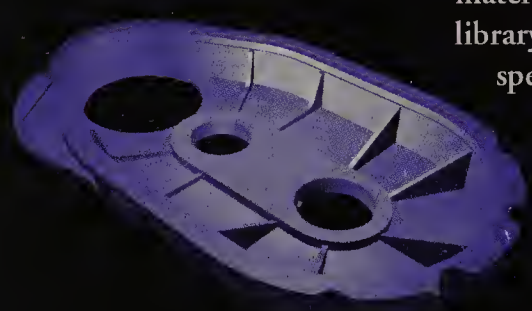

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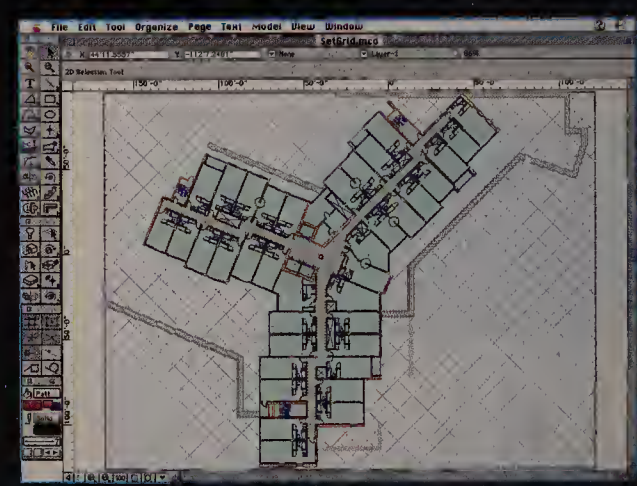

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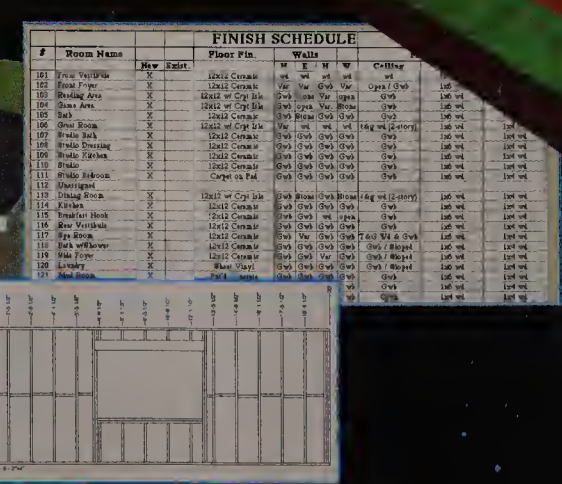
MiniCAD 7—The only thing small is the price.



by Adrian Mello

Apple Must Not Stall Other Mac Makers

AN OPEN LICENSING STRATEGY IS ESSENTIAL TO THE MAC'S SURVIVAL

APPLE COMPUTER IS facing a crucial juncture in the road back to prosperity. The company appears to be struggling with whether or not it will support an open licensing strategy for the Mac OS and its licensees such as Motorola, Power Computing, and Umax.

If you've been following *Macworld*'s coverage both in print and online, you know we've been concerned about the mixed messages Apple has been giving on the topic of licensing. Apple claims that it still fully supports licensing of the Mac OS, but its actions indicate that it may be cooling toward a truly open approach to licensing. It's difficult to tell whether Apple is being intentionally misleading or is just confused.

For the last couple of years Apple has said that it needs the Common Hardware Reference Platform (CHRP) to provide a standard and thereby alleviate the tremendous level of support it must currently provide. As CHRP approaches, events have transpired that make me wonder if Apple will let CHRP fulfill its potential. As it stands, the promise of an open platform seems threatened by Apple's restrictive new licensing terms, restrictive certification procedures, and confusing delays with the CHRP OS and ROMs (see "Apple Pins Hopes on Gossamer," *News*, in this issue).

Why Is Licensing Important?

You may question why licensing the Mac OS is so important. After all, the Mac market prospered for years with Apple as the sole Mac vendor. But that prosperity has always been somewhat fragile. The main reason Apple has proved so vulnerable in recent years is its historical reluctance to license the Mac OS. If the Mac market were divided among more computer makers, Apple could recover much more easily from its problems.

Such diversity is the main advantage to licensing. Instead of one company's attempting to predict the market and negotiate the inevitable obstacles, there would be several licensees with different approaches and reactions. Some approaches would be more effective than others, but the Mac market itself would adapt more readily and be healthier instead of depending on the fortunes of a single hardware vendor. It's a natural system, and it works.

The diversity of Mac OS licensees can reinvigorate the Mac market. Having a number of computer makers racing for the technological lead pushes the platform forward and gives customers new products and options to get excited about. The combined marketing efforts of several computer makers would result in more overall exposure for the Mac and would reach more potential customers.

A Difficult Choice

But licensing is also dangerous because it presents Apple with a competitive threat. Much of the success of Mac licensees has come at the expense of Apple computer sales. However, that success is also due to the fact that licensees have had better price/performance and more aggressive marketing than Apple. In the short term Apple will probably have to accept that it will lose an even greater piece of the Macintosh market to its licensees. It would be easy for Apple to view the licensees as parasites who threaten to destroy the very body that sustains their life. But that sort of parochial viewpoint would prevent the diversity essential to restoring the Mac market's health.

Apple faces a difficult choice. A truly open licensing strategy would involve speeding the introduction of CHRP, creating an independent and fair basis for certification, and avoiding restrictive licensing terms. This strategy could help jump-start the market but would further erode Apple's revenues and thereby force more restructuring. If Apple doesn't embrace an open licensing strategy, though, it might slow down the pace of innovation and marketing needed to recharge the Mac market. Worse yet, Apple could quickly discourage Mac licensees and eventually lead them to invest their resources outside the Mac market.

Apple has no choice—it must support an open licensing strategy. It must manage its short-term difficulties as best it can, but it should not give up on open licensing. If compromise is necessary, Apple should work with its licensees to enlist their support rather than treating them like interlopers. Similarly, licensees must accept a transitional period with terms that permit Apple to work out its current financial challenges—as long as there is a clear end to such a transition.

The stakes are immense, and the Mac market lies in the balance. m

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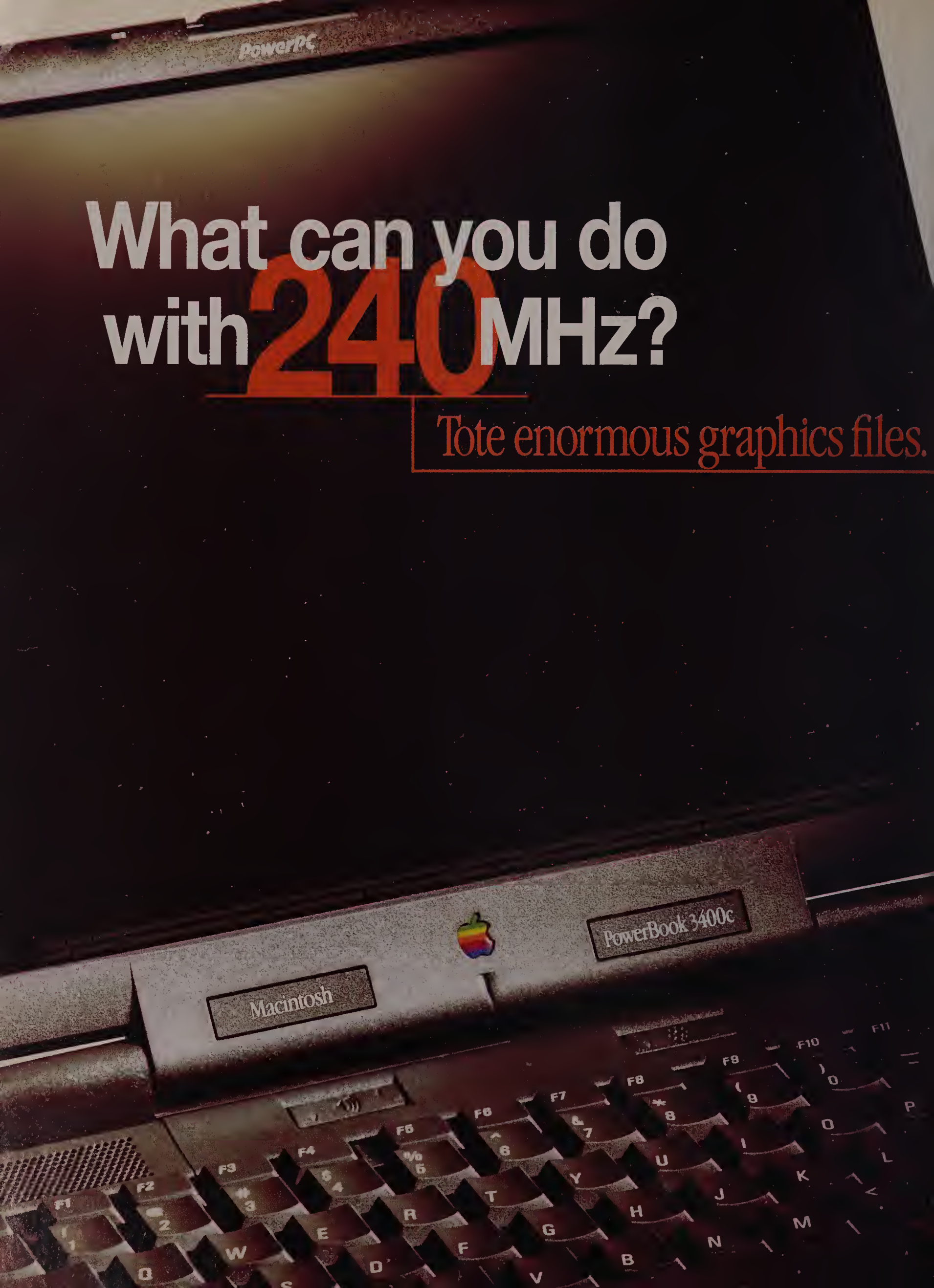

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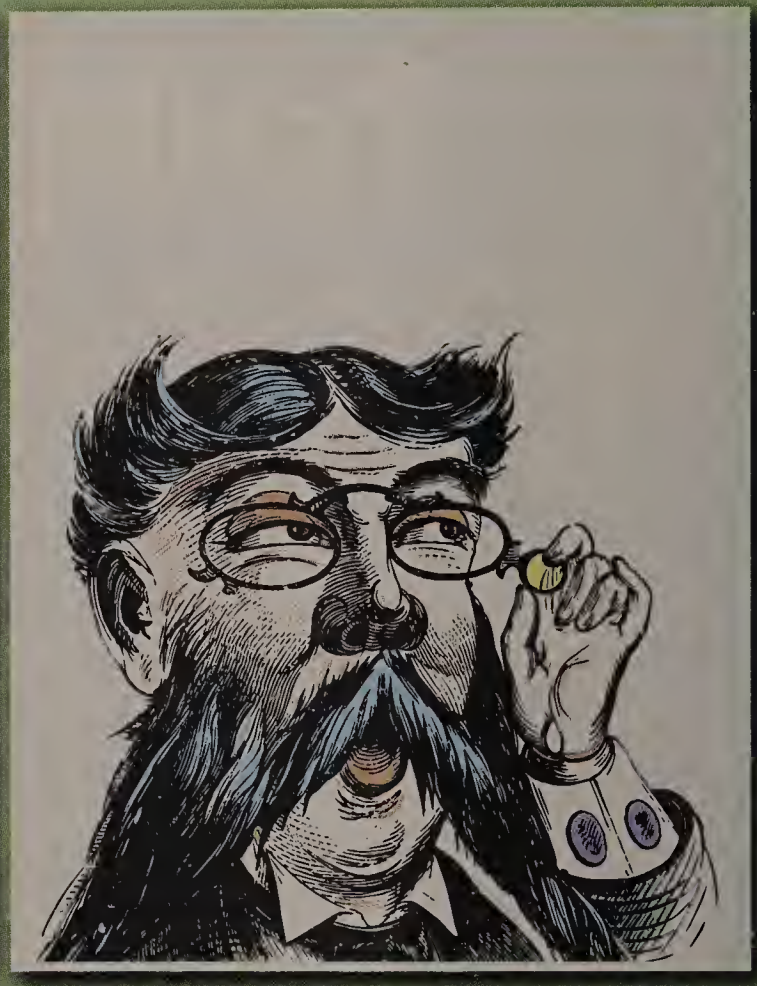
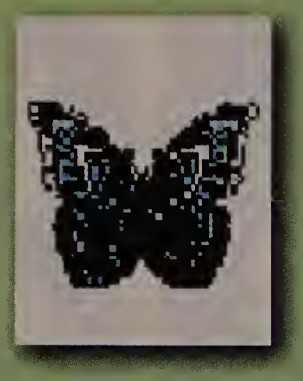
This EPS image was printed on an inkjet **without** StyleScript



This EPS image was printed on an inkjet **with** StyleScript

Take a close look.

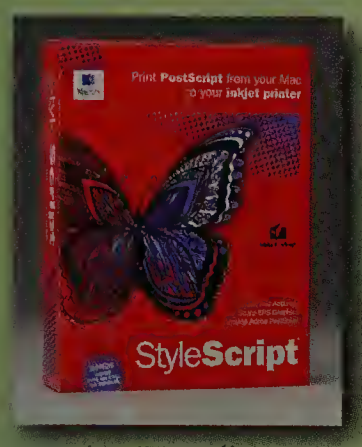
This Encapsulated PostScript (EPS) image was printed on a color inkjet printer **without** StyleScript



This Encapsulated PostScript (EPS) image was printed on a color inkjet printer **with** StyleScript

See for yourself what a startling difference StyleScript makes on an inkjet printer

StyleScript turns your inkjet into a genuine Adobe PostScript printer



If you've been using your inkjet to print EPS graphics, you've probably seen something called the "jaggies". Although your inkjet is a very good quality color printer and very affordably priced, it is not PostScript. This means it will print your photos beautifully but is unable to print EPS clip-art or logos. The printed results will be jagged and certainly not what you were expecting. You need PostScript printing but PostScript printers are very expensive. That's where the StyleScript solution comes in.

StyleScript is a software package that will upgrade your inkjet into a PostScript printer, at a fraction of the cost. With StyleScript installed, you can print *any* image on your inkjet with great results. That's because StyleScript is genuine Adobe Level 2 PostScript software. Your documents will print sharp everytime — no surprises and no "jaggies". The samples above and on the facing page show what a big difference StyleScript will make on your output. And the best part — StyleScript costs less than $100.

The Benefits of StyleScript

Once you have installed StyleScript, you'll see the improvements in your printed documents right away:

- EPS clip-art and logos will be crisp and clean
- PostScript fonts will be sharp at any size or angle
- color will be more accurate
- screens/dither patterns will be better looking

Who uses StyleScript?

StyleScript is perfect for anyone who owns an inkjet printer and needs to print sharp looking graphics. That includes:

- home or education users who want to use EPS clip art on everything from house party invitations to t-shirt graphics
- graphic designers who want an inexpensive and accurate personal proofing system
- business users making presentations on paper, transparencies, or film

Supported Printers

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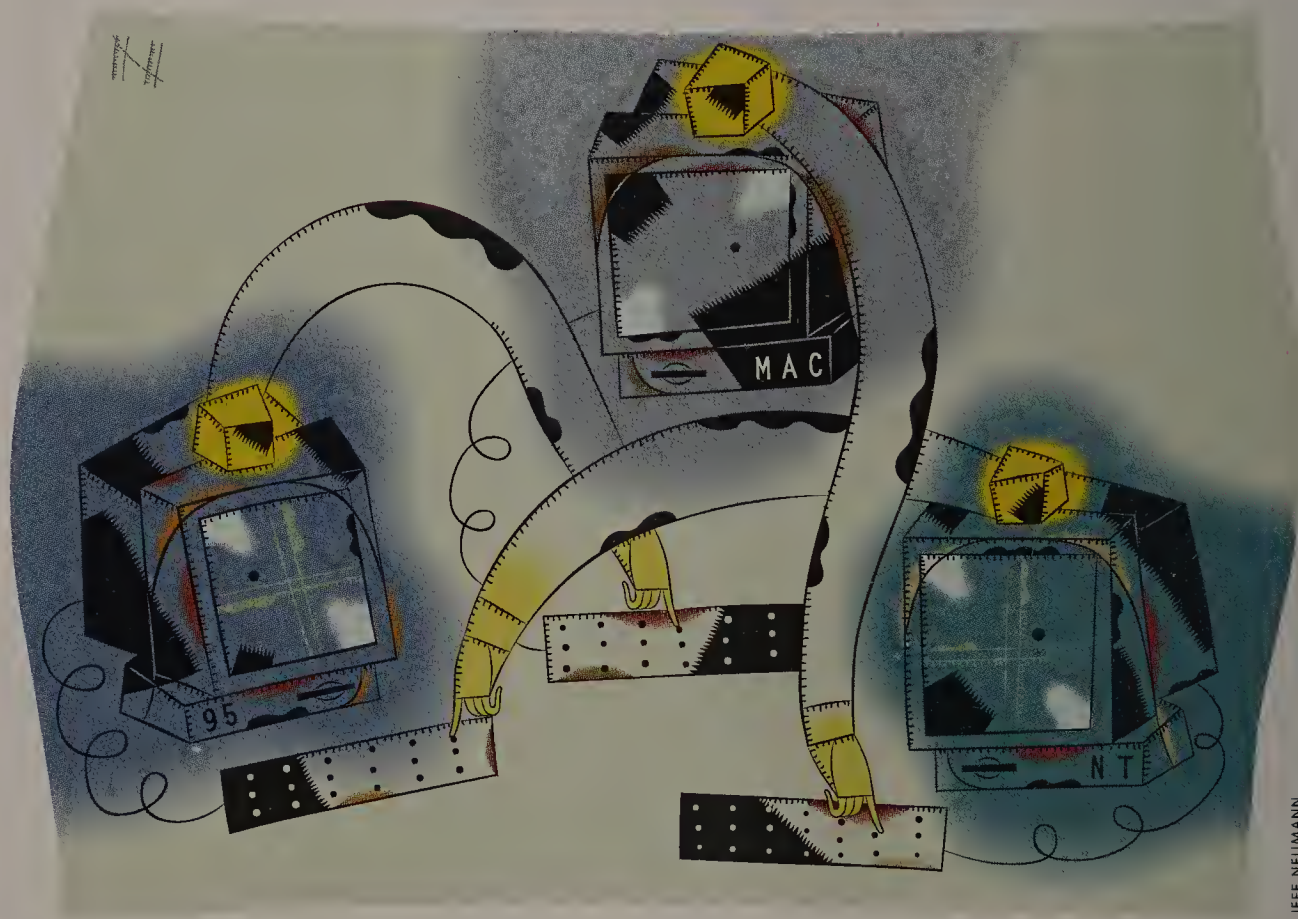
News

SPECIAL REPORT

Apple Steps into the Yellow Box

OPENSTEP IS KEY TO CROSS-PLATFORM OS STRATEGY

by Cameron Crotty



JEFF NEUMANN

Every baseball team wants a superstar, a slugger that the rest of the team can rely on for victory. In Apple's latest system software vision, the franchise player is a promising minor leaguer called the Yellow Box. At the Worldwide Developers Conference in May, Apple announced a new strategy in which Yellow Box applications will run on multiple operating systems and hardware platforms. Write once for the Yellow Box, Apple promises developers, and you can deploy your applications on PowerPC or Intel hardware, running under the Mac or Windows OS.

Remember Rhapsody Apple introduced the Yellow Box as part of Rhapsody, its next-generation operating system. The Yellow Box is based on the OpenStep Application Programming Interfaces (APIs) that Apple bought with Next, and supports all the whizzy modern OS features—such as preemptive multitasking and protected memory—provided by the Mach microkernel (see the sidebar "Follow the Yellow Box").

But thanks to OpenStep's object-oriented design, the Yellow Box isn't tied to any particular CPU, or even to any kernel (the software that talks directly to the computer hardware). So Apple has announced four separate products, to be released by mid-1998.

- Rhapsody for PowerPC will include the Yellow Box, the Mach microkernel, and the Blue Box for running current Mac OS applications. This mix will run on all PowerPC machines shipped after January 1997, plus CHRP machines.
- Rhapsody for Intel processors will include the Yellow Box and the Mach microkernel, but no Blue Box.
- Yellow Box for Mac OS will run within Allegro, the code name for a 1998 Mac OS release. Because the applications will run on top of the Mac OS, they will not be able to take advantage of preemptive multitasking, protected memory, or other modern OS features in the Mach kernel.
- Yellow Box for Windows will run within Windows 95 and NT. Like Yellow Box for Mac OS, it is a mix of translat-

ed calls to the native OS (in this case Win32) and direct calls to the underlying hardware.

Apple is unlikely to create a version of Rhapsody that runs on 680X0 Macs.

Developers' Dream For software developers, the strategy sounds like a dream. Apple says that developers will be able to write an application once, then simply recompile it for each platform, creating Rhapsody, Macintosh, and Windows applications from a single code base. Apple also says that the Yellow Box running on Windows 95, Windows NT, and the Allegro Mac OS will take advantage of the native strengths of each platform. For example, in the Windows version, developers will theoretically be able to send OLE messages—the Windows equivalent of Apple events—and use ActiveX controls just as if the applications were running under Windows.

Yellow Box applications will have a different look-and-feel depending on the platform on which they're hosted. Rhapsody for PowerPC and Rhapsody for Intel will share what Apple calls the Advanced Mac look-and-feel: a blend of the Mac and Next user interfaces. But Yellow Box applications running on Windows or the Mac will use the native interface of the platform. So if you're running the Mac OS, a Yellow Box application will appear just like everything else on your desktop. Similarly, a Yellow Box application under Windows will look like a native Windows application. Developers will be able to bundle free Yellow Box libraries for the Mac OS and Windows with their applications.

What's in the Box? On paper, the Yellow Box appears to be a strong development platform, as Apple is combining the best parts of the Mac and Next OSs. From the Mac-

continues on page 40

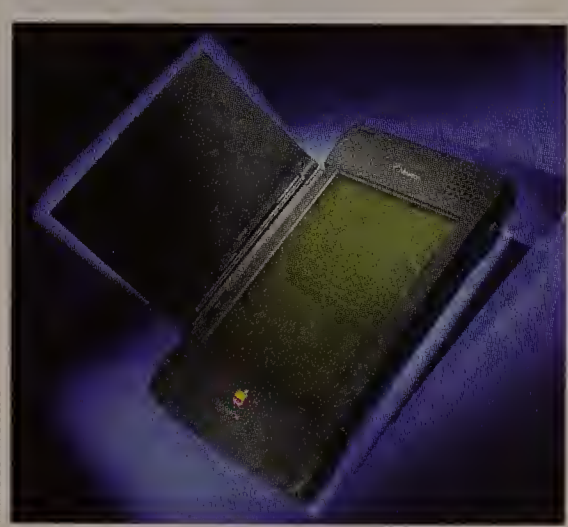
industry

Apple Spins Out Newton Division

NEW SUBSIDIARY TO HANDLE PDA PRODUCTS

by Stephen Beale and Cameron Crotty

Apple Computer (408/996-1010, *www.apple.com*) took another step in its restructuring efforts May 22 when it announced that it will spin off its Newton Systems Group into a wholly owned subsidiary dedicated to Newton-based products.



ARNOLD TIOSEJO

Apple's MessagePad 2000 has found a new home.

License to eMate The as-yet-unnamed company will assume control of the MessagePad 2000 personal digital assistant (see *Reviews*, July 1997) and eMate 300 notebook computer (see *Reviews* in this issue), both of which are based on the Newton operating system. The subsidiary will support, sell, and market the MessagePad 2000. Apple will have an exclusive license to handle those responsibilities for the eMate 300.

Apple has not named a CEO for the new company, but has appointed Sandy Benett as chief operating officer. Benett was previously vice president of the Newton Systems Group.

Newton developers are enthusiastic about the move. "This is great," says Ken Landau, president of LandWare (201/261-7944, *www.landware.com*). "Now [the Newton company] can focus on their operating system without a cloud hanging over their head." Other developers agree, saying that greater distance from Apple might increase consumer confidence.

No Partners At the Seybold New York conference in April, Apple executive vice president of technology Ellen Hancock said the company was looking for an investment partner for the Newton Systems Group. But Apple failed to find any takers, and Apple chief financial officer Fred Anderson says the spin-off will make the Newton unit more attractive to potential investors, or as a public stock offering. He expects the new company to be profitable within 12 months of its June 30 incorporation date.

The Newton Systems Group has long symbolized Apple's lack of corporate focus, and many observers expected the unit to be among the first restructuring casualties (see "Amelio Carves a New Apple," *News*, June 1997). But sales rose dramatically following the successful introduction of the MessagePad 2000 and the eMate 300 early this year.

About 170 people will leave Apple's payroll; Benett hopes to move most of them to the new company, which will be located outside the Apple campus.

printing

Epson and Encad Hit the Big Time

AFFORDABLE LARGE-FORMAT INK-JETS ARRIVE

by Andrea Dudrow

Producing full-color poster-size prints used to mean a hike to your local service bureau. Now, Epson America (310/782-0770, *www.epson.com*) and Encad (619/452-0882, *www.encad.com*) are making it easier to bring wide-format printing in-house with the introduction of color ink-jets priced less than $2500.

Epson's new Color Stylus 1520 can print on media up to 13.6 by 22 inches, while the Color Stylus 3000 covers up to 16.4 by 21 inches. Both offer 1440-by-720-dpi resolution and are based on the company's Micro Piezo technology, which uses electromagnetic pressure instead of heat to place ink on the page.

The $799 Color Stylus 1520 prints up to six mono-

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Tatung Shows 75MHz System Bus 38

KEVIN CANDLAND

Epson's Color Stylus 3000 will sell for $1995.

chrome or five color pages per minute; PostScript is available as a $99 option. The $1995 Color Stylus 3000 prints up to seven color or monochrome pages per minute and includes Adobe PostScript Level 2. Ethernet ($389) and LocalTalk ($143) are options.

Encad's Croma24 produces 300-dpi prints on roll-fed paper up to 24 inches wide. It includes an automatic paper cutter and prints at speeds ranging from 2.5 to 24 minutes per page, depending on the complexity of the image. The base Macintosh model sells for $2395; a PostScript version is available for $2995.

publishing

QuarkXPress Adds Drawing Features

UPGRADE ALSO SUPPORTS LONG DOCUMENTS

by Stephen Beale

QuarkXPress 4.0 could turn out to be the most dangerous software upgrade in the history of publishing. Designers love to try out the new features in their favorite programs, and this version gives them a host of new drawing capabilities sure to cause some visual mayhem: head-lines spinning along curves, text wraps from another dimension, and more. But even those with more prosaic design needs will probably find much to like in this long-awaited upgrade.

It's been four years since Quark (303/894-8888, *www.quark.com*) last overhauled its crown jewel, a time in which Adobe released two upgrades of archrival PageMaker. Some of the new features in QuarkXPress 4.0, especially those oriented toward creating long documents, bring the program to parity with traditional PageMaker strengths. Others, most notably character style sheets, appear to push QuarkXPress past its competition. Quark has not announced pricing or a release date for the software.

Illustrator XPress Adobe Illustrator and Macromedia FreeHand both incorporate many page-layout features. QuarkXPress 4.0 returns the favor by adding Bézier line and curve tools plus many new illustration features. You can read clipping paths in imported EPS and TIFF files, automatically drop white or near-white backgrounds to create your own clipping paths, and use the built-in Bézier tools to edit them. All of these features will make it easier to create complex, irregular text wraps.

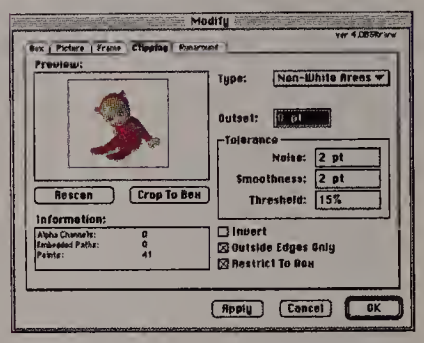
You can also run text along a curve, convert text into Bézier shapes, and create complex shapes from intersections of existing ones using eight Merge and Split commands. Some of these features were previously available through QuarkXTensions, but now they are built into the program.

Other new functions let you embed any shape within text, run a single column of text around both sides of an image, and simultaneously resize all items within a group.

Characters in Style One feature long on the wish lists of QuarkXPress users is character style sheets. Until now, you could apply a style only to an entire paragraph. Character styles can be applied to selected text within a paragraph—such as the subhead in this paragraph—leaving the rest of the text alone.

An enhanced find-and-change function lets you replace paragraph and character styles from a movable palette.

Long-Document Features One area in which PageMaker has traditionally had a lead on QuarkXPress is long-document production. If you wanted to create an index or table of contents from your QuarkXPress document, you had to



QuarkXPress 4.0 can automatically remove image backgrounds.

purchase a QuarkXTension. Now these features are built into the program, along with a Book feature that lets you create a long document from multiple QuarkXPress files. The upgrade also increases the number of paragraphs you can have in a document.

Printing An enhanced preview function lets you see how your output is positioned on the paper. You can also print noncontinuous pages and create printer styles that can be saved for reuse. QuarkXPress 4.0 also adds support for Pantone's Hexachrome Hi-Fi printing process, which uses six primary colors instead of the traditional CMYK.

graphics

Digital Watermarks Move Ahead

NEW VENDORS JUMP ON THE BANDWAGON

by Cathy Abes

Digital watermarking—the embedding of an imperceptible watermark in digital imagery and other works—has generated much interest, and some skepticism, among content creators anxious to protect their work from unauthorize use. So far, the technology has been the domain of two companies: Digimarc (503/223-0118, *www.digimarc.com*), which dominates the U.S. market, and U.K.-based HighWater Signum (*www.highwatersignum.com*), which has targeted users overseas. Now both companies face potential competitors.

Watermarks and Fingerprints Digimarc's free PictureMarc plug-ins, which ship with Adobe Photoshop 4.0, embed and detect watermarks that contain a Creator ID, an Image or Transaction ID, and image attributes. Digimarc also offers ReadMarc, a free stand-alone watermark reader, and BatchMarc Pro, which is geared to stock houses and other large-volume image distributors. For $99 per year, you can be listed in the company's MarcCentre online service, which allows potential licensees to locate the owners of watermarked artwork. In June Digimarc will introduce MarcSpider—free to MarcCentre users—which tracks authorized and unauthorized use of watermarked art on the Web.

BatchMarc Pro pricing

(which includes the MarcCentre and MarcSpider services) ranges from $2000 to $15,000 depending on the volume of images (from 2000 to 1 million).

After forging alliances with Adobe, Live Picture, Corel, and others, Digimarc has most recently licensed its watermarking to Israel-based Aliroo (714/488-0253, *www.aliroo.com*) for use in Aliroo's ScarLet image copyright protection and commerce program, now available on Windows. A Mac version is due to ship in October, with pricing based on a royalty percentage (about 5 percent) for each image sold.

Although it has technology similar to Digimarc's, HighWater Signum uses the term *fingerprint* rather than *watermark*. In addition to its $99 SureSign Writer Photoshop plug-in, HighWater offers three free fingerprint-detection tools: SureSign Detector, a Photoshop plug-in; Desktop Detective, a stand-alone utility; and CyberSleuth, a browser plug-in.

Rounding out the line is the $1495 SureSign Pro, which offers detection and automatic fingerprinting of up to 50,000 images.

HighWater stores copyright-holder data in a Visual Creators' Index, which provides a six-character code for the copyright holder and a seven-character code for identifying the image or transaction. The data is accessible on HighWater's Web site via the SureSign Registry (similar to Digimarc's MarcCentre). SureSign users pay $40, and SureSign Pro users pay $150, to list their work.

More Competition Other watermarking technologies are on the way. Copyright Clearance Center (508/750-8400, *www.copyright.com*), a nonprofit rights-management organization that represents about 9800 publishers and licenses 1.75 million publications, is developing a technology that creates a unique ID tied to a specific transaction. Currently, CCC handles books, magazines, illustrations, and photos, but it will soon add video and sound.

Using an internal database containing rights information for about 4 million works of art, CCC can tell who currently owns the rights to a work and what rights are available for commercial use.

CCC plans to make customized versions of its database available to vendors for identifying and managing rights and tracking usage. Also in the works are automated asset-management systems for handling licensing and ownership information, which should be available in three to five years.

A new NEC company called Signify (609/734-7620) describes its technology as *deep watermarking* because the watermarks are detectable only by the owner and thus cannot be unlawfully removed. Each image gets two watermarks: one with owner information and the second containing details on a specific picture and who has licensed it. Signify expects to ship its first Mac product, Invisible Ink for Images, by early August.

Media WATCH

BY CATHY ABES

High-Powered 3-D

MetaCreations (formerly Fractal Design; 408/430-4000, *www.fractal.com*) is readying a major upgrade to Ray Dream Studio, its 3-D modeling, rendering, and animation package. Sporting a lower price ($449; upgrades $99), version 5.0 offers vertex-level modeling, physics-based animation, new rendering effects, and improved performance—including the ability to redraw four times faster than the previous version.

Ray Dream's vertex modeler lets you generate models by extruding, lathing, lofting, and sweeping; you can deform surfaces by pushing or pulling models, and use Boolean operators to add or subtract geometry. A Direct Manipulation mode lets you move and instantly see the effects of lights, cameras, deformers, and links.

You can create and animate natural effects—including fire, fog, clouds, and fountains—with volumetric and particle-based primitives. New physics-based behaviors for realistic animation include gravity, velocity, friction, and collision tracking, which lets you position objects on surfaces such as tables or floors. The software is slated for a July release.

A New Spin on QTVR

QuickTime VR has not been among Apple's most popular technologies, but PictureWorks Technology (510/855-2001, *www.pictureworks.com*) is betting this will soon change. The maker of PhotoEnhancer, a simple image editor for digital cameras, PictureWorks has introduced Spin Panorama, which lets Mac and Windows users create interactive 360-degree movies using QTVR. Spin solves the thorniest QTVR problem by making it easy to seamlessly stitch together the photos that make up a panorama. A hybrid Mac-and-Windows version is available for an introductory price of $80 (retail price is $100).

Meanwhile, PictureWorks is also replacing PhotoEnhancer with HotShots, an image editor for business professionals who want to add photos to their documents without having to become graphic artists. Tools such as QuickFix, SmartPix, and SmartPrint allow novices to easily adjust, correct, and print sharp-looking images. HotShots is expected to sell in the $50 to $80 range.

Quark in a Buying Mood

With all the consolidation among graphics software vendors, it's getting harder to find an independent company to buy. Quark, entering what it describes as an "aggressive acquisition mode," has announced its intent to purchase mFactory, maker of the object-oriented multimedia authoring package mTropolis. The buyout, subject to approval by mFactory shareholders, will be executed through a "Quark-affiliated company." Both companies are privately held, and neither disclosed the financial terms of the deal.

Special REPORT

Apple Plays Catch-up in Games Market

BY CAMERON CROTTY

Suppose the Macintosh games market were a comic book: the current frame would show the archvillain raining body blows on our overmatched superhero. Shelf space for Mac games remains scarce, Apple is too busy shoring up other markets to do more than pay lip service to games, and several large developers are cutting projects and may abandon the Mac completely to focus on Windows PCs. It's tempting to write off the games market as a frivolous diversion. But while the games may be fantasies, the money spent on them is real. PC games and entertainment software accounted for $1.7 billion in sales in 1996, nearly 36 percent of the total PC consumer software market, according to IDC/Link's Electronic Gaming Forecast. Games accounted for 34 percent of all software units sold on the Macintosh platform, according to figures from market researcher PC Data, and many in the industry consider this a conservative estimate.

Games don't just make money for software vendors. It's conventional wisdom in the PC gaming industry that resource-hungry games drive sales of high-end hardware. "Microsoft Word isn't going to go that much faster, but a game on one of the faster machines blows you away," says Eric Johnson, Activision's vice president of sales and marketing. "It's a reason to go out and buy a new computer."

A Rocky Start Mac games developers have had a rocky road since the early days, when Apple actively discouraged games so the Mac would not be viewed as a toy.

Over the past few years, Apple has relented, even developing Game Sprockets, a technology that helps developers create Macintosh games.

But we may be on the brink of a dark time for Mac games. Companies continue to question Apple's commitment to games. It's becoming harder to buy and sell Mac games—the last Christmas season was especially bad—as retail stores and mail-order catalogs become increasingly expensive and challenging environments. And the constant turmoil at Apple hangs like a pall, tainting public perception and making large, PC-based game companies even more skittish.

Lukewarm Attitude Apple's attitude toward games, while improving, is only lukewarm. Apple says it supports games and wants to play big in the consumer market, but it hasn't put its money where its mouth is, especially compared with Microsoft. Johnson, for example, says that Microsoft gave Activision market-development funds and provided engineers to help optimize its games for Windows 95. He characterizes Apple's overtures as halfhearted and unconvincing.

As part of its March 14 restructuring, Apple reduced funding for its Game Sprockets team, which creates software that helps developers write Mac games. Developers agree this won't prevent them from creating Mac games, and perhaps may focus Apple's remaining resources even more sharply. But they also see it as a sign of weakening commitment to the games market.

Apple's games evangelist, Mark Gavini, argues that games are a priority at Apple but couldn't give specifics on plans for developer support, which suggests a lack of crucial backing at the executive level. As one developer said bluntly, "[Apple vice president of marketing] Guerrino De Luca needs to be educated as to the importance of games."

Apple insiders confirm upper management's lack of concern for games. "It's a disservice to the universe that [the Game Sprockets] guys can't get funding," fumes Ben Calica, who established the Game Sprockets team and ran it until he tired of explaining to his fifth boss (the previous four were fired or transferred) why games matter to the Macintosh. "The really sad thing was how efficient we were—Microsoft spent more on their booth at the Game Developers' Conference than we spent in an entire year."

Trouble in Delivery Even a truckload of great Mac games is useless if there's no place to buy them, and the current retail and mail-order climate is hostile. PC game companies pay retailers large fees to stock stores with their titles, reducing available shelf space for Mac titles. The retailers' software buyers compound the problem through their lack of knowledge of the Mac market, either stocking inappropriate titles or not stocking Mac software at all. According to MacSoft president Peter Tamte, "[The software buyers] are saying, '[A Mac game] may be the greatest thing since sliced bread, but I'm not going to take the time to figure it out because it's a very small portion of my business.'"

Mail-order catalogs are a popular source of Mac software and have traditionally been a good way for smaller game companies to connect with users. But the fees for advertising in such catalogs have climbed to the point that many game companies say they are breaking even or losing money on titles they sell through the catalogs.

Several Mac game companies have established a trade group, the Mac OS Entertainment Software Association, that hopes to negotiate better agreements. Apple helped organize the group, but so far, spokespeople say, Apple hasn't offered any concrete—that is to say financial—support.

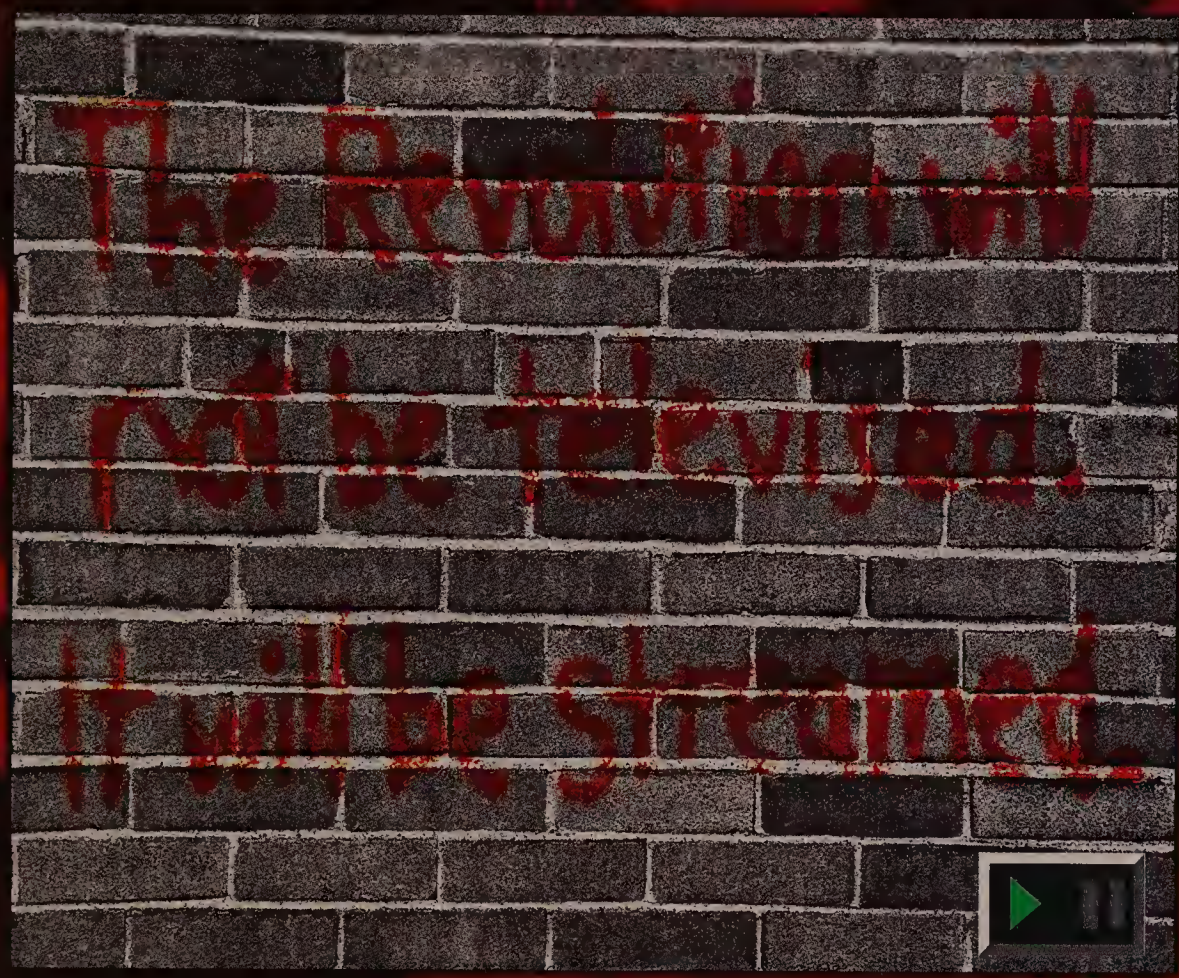
Hanging Tough Currently, the biggest problem for Mac game developers is the public's perception that the Macintosh is headed for a fiery death. Activision's Johnson states flatly, "It takes us two years to make a game. If I start a game today, do I think that there's going to be an audience [when I finish], and what kind of machine are they going to have?"

Macintosh gamers can look forward to a slew of promising releases (see the sidebar, "Games on the Horizon"). Early this year GT Interactive acquired MacSoft, which immediately laid out a solid schedule for bringing

continues

PETER HOEY

VIVO!



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some long-awaited top PC titles to the Mac. But other large game companies are being cautious about their Macintosh commitments. MacPlay will ship three titles in the coming months but has killed three titles that were scheduled for this year (NBA Jam, Shattered Steel, and Tempest 2000), sparking

rumors that the company was leaving the Mac market. A MacPlay spokeswoman denied these rumors and cited serious development problems with each project that was canceled.

Activision released six Mac titles in 1996 but has solid plans only for another version of Shanghai—essentially a board game with the widest possible gaming appeal. LucasArts, which released five Macintosh titles in 1996, will commit only to the TIE Fighter Collector's CD-ROM —a long-awaited port of a two-year-old PC title. Activision and LucasArts say they may port other projects, but both appear to be holding the Mac market at arm's length.

So while it's not time to close the Macintosh games comic book, it's definitely time to turn the page. After all, Superman never let a little Kryptonite get him down. Maybe our hero just needs another few frames to deliver the knockout punch.

Games on the Horizon

VENDORS PLAN 1997 MAC RELEASES

Don't despair—cool games are definitely on the way. Here are a few of the top titles you can look forward to.

MacSoft/GT Interactive *(800/469-5961, www.wizworks.com/macsoft)*
June: Duke Nukem 3D (first-person action)
July: Quake (first-person action)
August: Civilization (strategy), Master of Orion II (strategy)
November: Unreal (first-person action)
Late 1997/early 1998: Top Gun (flight simulation), Falcon 4 (flight simulation)

Activision *(310/473-9200, www.activision.com)*
Summer: Shanghai (strategy)

Bungie Software *(312/563-6200, www.bungie.com)*
December: Myth (action/strategy)

Blizzard *(800/953-7669, www.blizzard.com)*
June: Warcraft Adventures (role-playing adventure)
July: Diablo (action adventure), Changeling *(512/419-7085, www.changeling.com)*
August: Ares (sci-fi strategy)

LucasArts *(800/985-8227, www.lucasarts.com)*
July: TIE Fighter Collector's CD-ROM (sci-fi flight simulation)

Parsoft Interactive *(972/379-4462, www.parsoft.com)*
September: Screamin' Demons (flight simulation)

MacPlay/Interplay *(714/553-6655, www.macplay.com)*
May: Starfleet Academy (sci-fi action)
June: Fallout (role-playing)
July: Blood and Magic (fantasy adventure)

SPECIAL REPORT

Apple Pins Hopes on Gossamer

APPARENT STRATEGY MAY SLOW COMPETITORS

by Galen Gruman

Apple Computer is banking on two new system designs to re-energize its Mac sales and profits. One, code-named Kansas, is due between September and November, while the other, code-named Gossamer, is due by the January 1998 Macworld Expo in San Francisco, according to several industry sources. The systems would replace the Power Mac 9600 and perhaps 8600. (Apple does not comment on unannounced products.)

Next-Generation CPUs The Kansas system, likely to be named the 9700, is essentially a modified 9600 that is likely to use the forthcoming PowerPC G3 CPU at initial speeds of 266MHz, along with a new inline cache that essentially doubles the CPU-to-cache communication speed to 100MHz. The system also has a 50MHz bus, sources say. It is unclear whether Apple will use the PowerPC 740 or 750 G3 CPUs; the 750 has a direct, high-speed cache connection, while the 740 uses the system bus or an inline cache bus.

The Gossamer will likely use the forthcoming 300MHz and 350MHz PowerPC 604e, redesigned versions of today's 604e known by the code-name Mach 5. It will likely have a 66MHz system bus, the same speed the Common Hardware Reference Platform (CHRP) will initially offer. But Apple will use a mix of proprietary and CHRP technologies, not a pure CHRP solution.

Constrained Competitors High-end systems are the most profitable, and in the last year Apple has faced fierce competition in this arena—primarily from Power Computing and Umax Computer—while losing money on entry-level Power Macs and Performas. To help ensure that its new systems earn enough profits, Apple has apparently decided to keep the competition at bay, giving itself a head start in selling the next generation of high-performance Macs, according to industry sources.

According to sources, Apple won't let the other Mac makers use the G3 or Mach 5 CPUs in their existing designs. Instead, they must use them in CHRP systems, ostensibly to reduce the certification effort at Apple by cutting the number of systems to be certified.

Certification can take a month or more, and lets Apple decide whether to permit another Mac maker's technology, even though CHRP was meant to get Apple out of the certification business by providing an open standard with independently verifiable requirements. The other Mac makers have called on Apple to disband its certification requirement or to let them set up a neutral, independent certification process, but Apple has so far declined.

CHRP Foundation Delays No matter what CPUs a Mac maker decides to use, its CHRP systems will be delayed because Apple is late in delivering the two fundamental CHRP technologies: a CHRP-enabled Mac OS and ROM.

CHRP promises to boost the market for the Mac OS by making it easier and cheaper for vendors to build Mac systems. To fulfill this promise, Apple must separate the Mac OS from the Macintosh ROM.

continues

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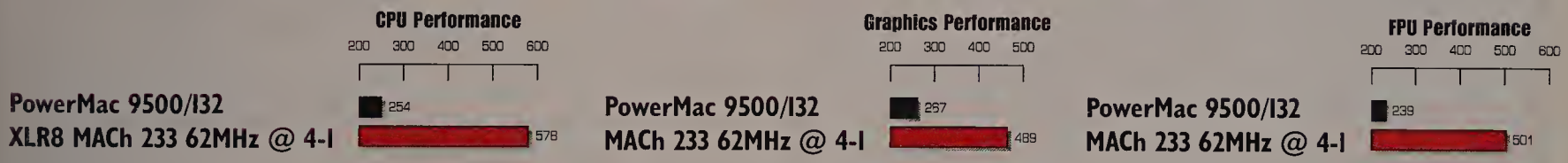

MacBench 4.0 results using PowerMac 9500, 16 MB RAM, on board SCSI, no hardware disk cache, 512K disk cache, running System 7.6. All products used in this test were shipping versions available to the public. All tests were performed by the XLR8 division of Interex. Ziff-Davis makes no representations or warranties as to the results of this test.

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Circle 18 on reader service card

But in May, a mere two months before the first CHRP-enabled Mac OS was originally expected to ship, Apple's top hardware-systems engineer, Jon Rubinstein, said the company wasn't even close to achieving this goal. Among the companies awaiting the CHRP OS and ROM are Akia, Motorola Computer Group, Tatung, and Umax Computer—all of whom have shown working CHRP prototypes.

However, in a May meeting with *Macworld* editors, Apple's Rubinstein said that CHRP ROMs will not be available until at least a month after the Mac OS 8 July ship date. According to other sources, Apple could be as much as two months behind on the CHRP software and ROMs, which Mac makers originally hoped would be ready for the Mac OS 8 ship. Although Mac OS 8 will be the first Mac OS to support CHRP, no company will be able to ship a CHRP-based Mac until the ROMs are available, Rubinstein said.

According to sources, Apple's delay has less to do with engineering issues than with business decisions. The engineering work on CHRP is actually on schedule and nearly complete, says Apple's CHRP lead engineer Mike Bell, which sources at several licensees confirm—contrary to Rubinstein's statements.

Rubinstein also pushed back the schedule for offering a ROM-less Mac, estimating that it could take as much as 18 months to eliminate CHRP ROMs. He said that Apple engineers have told him it is impossible to create ROM-less systems, citing the difficulty of separating hardware dependencies from the Mac OS code inside the ROMs. Rubinstein said he does not accept this assertion and intends to make the separation happen. But Bell and sources outside Apple dispute that there is a delay, saying the basic separation has in fact already been completed.

Industry sources have also told *Macworld* that Apple may not include multiprocessing support for CHRP-based systems in Mac OS 8. Apple did not return calls about the subject. Support for IDE is also delayed because of a bug Apple found in popular IDE controller circuits, although Apple expects to have a software patch to offer IDE support in early August.

An Industry Waits The ROM and OS delays mean it's unlikely that Mac makers will be able to offer competing G3-based and Mach 5–based systems before Apple ships its Kansas and Gossamer systems. Apple has also decided not to license its Kansas and Gossamer motherboard designs to the other Mac makers, at least not until Apple has released its systems, an Apple official said (without admitting the existence of the two products).

Apple has said it will not create its own CHRP systems, so any delays in CHRP won't necessarily delay Apple products, although they will use some CHRP technologies.

Apple has commitments from IBM and Motorola for large volumes of the new CPUs, giving it priority over other Mac makers. One source told *Macworld* that the chip companies had little choice, since the other Mac makers won't be able to deliver systems—and thus won't be able to buy CPUs—until after Apple does.

Other Mac makers say they understand Apple's need to gain new revenues. But they are concerned that Apple's apparent tactic of suppressing or delaying competition will continue even after it delivers profitable systems, leaving unfulfilled the promise of a competitive, open Mac market.

BREAKING NEWS

FOR THE LATEST COVERAGE OF NEW MAC SYSTEMS AND APPLE'S OS PLANS, SEE MACWORLD DAILY, AT *WWW.MACWORLD.COM/DAILY/*.

ARNOLD TIOSEJO

New Tower Enclosures from APS

The MPower-series systems from APS Technologies (816/483-6100, *www.apstech.com*) have evolved. Improved tower enclosures for the MPower 604e's and 603e's replace one of the 5.25-inch bays with a 3.5-inch low-profile bay; now you get three of the former and four of the latter. The new towers ship with 300-watt rather than 200-watt power supplies, and the cases are easier to open, with removable side panels replacing the previous U-shaped metal frame and screws. Although they've gained an inch in girth—to increase airflow within the system—the towers are better-looking, with a curved bezel that sets them apart from the other Mac clones.

APS has also reduced prices across its lines, with the most dramatic decreases in the 200MHz 603e line. For example, users can now buy a bare-bones 200MHz MPower 603e for $699, down from $999.—TOVA FLIEGEL

SPECIAL REPORT

Show Me the Cache

UMAX CACHEDOUBLER PUTS SUPERMAC 603E IN A NEW LEAGUE

by Tova Fliegel

This is the year of high-speed buses and inline caching schemes for the Macintosh. Upcoming design changes, including motherboards based on the Common Hardware Reference Platform (CHRP), should help the system bus and cache keep up with ever-increasing CPU

continues

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Get all the details today—both on-screen and off—by calling Mitsubishi Electronics at **1-800-843-2515** in the U.S. and Mexico. In Canada call **1-800-387-9630**. *For immediate product specifications call Mitsubishi Qwikfax at* ***1-800-937-2094***. World Wide Web http://www.mitsubishi-display.com

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* DVI: Diagonal viewable image

Circle 261 on reader service card

ARNOLD TIOSEJO

CacheDoubler will debut in the SuperMac C600.

speeds. But vendors aren't waiting for CHRP to incorporate faster buses and inline cache. Power Computing has already introduced the PowerCenter Pro line with 60MHz buses (see *Reviews*, in this issue). And Umax Computer (510/226-6886, *www.supermac.com*) demonstrated its new inline cache card, the CacheDoubler, at Macworld Expo Taipei in May. The first systems using the card are expected to ship in July.

The CacheDoubler is inserted between the CPU and motherboard on Umax's PowerPC 603e–based C600 and C500 Macs. The card includes 1MB of cache running on an 80MHz processor bus, a substantial increase over the 40MHz system bus on which the 256K cache formerly resided. According to Macworld Lab tests, the inline cache card increases performance by about 17 percent and puts the 240MHz SuperMac C600 we tested in the number one 603e spot—ahead of the Apple Power Macintosh 6500/250 and the Motorola StarMax 3000 MT603e-240.

The CacheDoubler card will first appear in updated versions of the C600. The $1995 C600x/240 will ship with 32MB of RAM, a 3GB IDE drive, and a 10BaseT Ethernet card; the $2395 C600x/280 will feature a 4GB drive. In August, Umax plans to introduce a $300 stand-alone version of the CacheDoubler for users wishing to upgrade C600 and C500 systems.

The CacheDoubler, which plugs into a ZIP socket, initially will appear on low-end machines. However, Umax will ship a version for the high-end J700 and S900 series by the end of the year. The company also plans to beef up the S900 line with a July introduction of the S910, which will include a larger upgradable cache than the S900's, along with other enhancements.

SPECIAL REPORT

Tatung Shows First 75MHz System Bus

CHRP SYSTEM SHOULD SHIP THIS FALL

by Galen Gruman

During a keynote session at the recent Macworld Expo Taipei, Tatung *(www.tatung.com.tw/)* showed a prototype Mac system based on the Common Hardware Reference Platform (CHRP) using an engineering sample of the forthcoming 266MHz IBM PowerPC G3 and Tatung's 75MHz asynchronous system bus. The 75MHz bus is a first, for Macs and PCs.

Tatung hopes to ship systems based on these technologies later this year, but has been hampered by the continuing delays at Apple Computer in getting the Macintosh operating system to support CHRP systems and in getting the CHRP ROMs produced (see "Apple Pins Hopes on Gossamer" in this section). Current estimates are that no CHRP system will ship before October because of the delays.

Ready to Go Tatung's motherboards are complete, waiting the CHRP-compatible OS. Although the Mach 5 CPUs are not yet in production, Tatung is ready to produce systems using the 225MHz 604e's.

Tatung initially plans to sell Macs in the Asia/Pacific and northern Europe regions, focusing on high-performance systems for graphics and publishing professionals.

With a 225MHz CPU, the Tatung system, called the TPC-6600, has a CPU-

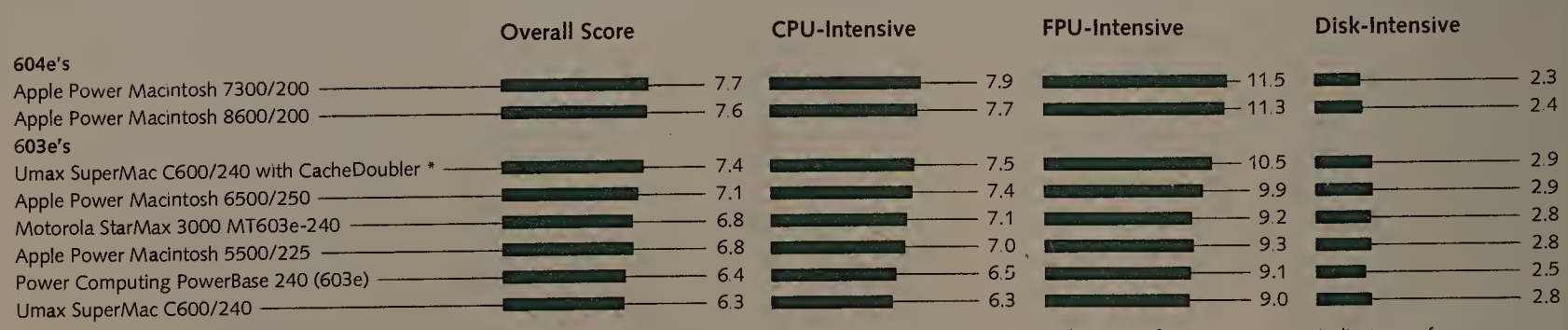
continues

Macworld LAB TEST

Umax's Cache Card Conquers the 603e Hill

Tests of a prototype CacheDoubler card from Umax boosted the performance of the SuperMac C600/240 by 17 percent, putting it in the same league as the Apple Power Macintosh 8600/200 and a bit ahead of the Power Mac 6500/250—the fastest 603e machine currently shipping.

Longer bars are better. Results are times as fast as a Centris 650 (Centris 650 = 1.0). Products are listed from fastest overall to slowest overall.

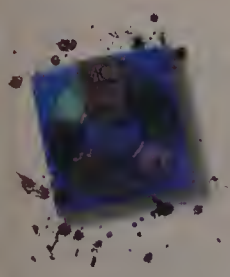


* *Prototype card*

Behind Our Tests

For detailed information on systems benchmarks, see *Mac Superguide*, January 1997.—**Macworld Lab testing supervised by Mark Hurlow**

Only One Company Can Give You **Removable Storage** This Rugged and Reliable. **Fujitsu.**



On location with the DynaMO® 230 and the DynaMO 640. When rock climbing, you'd never compromise with the tools you use. The same idea applies to backing up, transferring and transporting critical files. • That's where the DynaMO 230 and the DynaMO 640 come into the picture. They're the perfect tools for designers who need to transport and transfer graphics files, for sales organizations that need to store multimedia presentations on a single disk, and for government agencies that need to archive records. • In fact, you won't find removable storage that's more rugged or reliable. A single MO disk has a life span of over 10 million writes and over 100 million reads. • Which leads us to Fujitsu's customer support policy. No Excuses™. More than just a slogan, it's our commitment to provide you with the ultimate in service, including technical support at no charge. Which is just another way of saying, Fujitsu has set a new standard of excellence in removable storage. • The DynaMO 230 and DynaMO 640. When you add it all up, everything that matters is DynaMO driven. • DynaMO 230 and the DynaMO 640 are available wherever quality removable storage drives are sold. For more information, call 1-800-735-4510. Or discover DynaMO on our website at http://www.fcpa.com.

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Circle 202 on reader service card

to–bus-speed ratio of 3:1, which is more efficient than the typical ratios of 4.5:1 and 5:1 on most Macs. More-efficient operation means that the PowerPC power can be better harnessed, improving overall speed even with moderate-speed CPUs. The forthcoming 300MHz 604e would run at a ratio of 4:1, still better than most of today's Macs, letting it tap more from both its speed and the 75MHz system bus.

Less Overhead Because the Tatung bus is asynchronous, it has less communication overhead with motherboard components such as PCI slots, SCSI controllers, and RAM, so it should run faster than traditional synchronous buses. However, the Tatung Mac can also run in 66MHz synchronous mode if required by peripherals.

The TPC-6600 prototype also supports both EDO RAM and synchronous DRAM (SDRAM). EDO RAM, which has recently been added to some Mac systems, has been used on PCs for a couple of years, providing faster RAM access than traditional RAM. SDRAM, which is only now starting to be used on PCs, is faster still. The TPC-6600 prototype also has 1MB of on-board pipelined burst-mode cache, a cache technology common on PCs. Tatung's Mac design relies heavily on high-speed but inexpensive PC technologies, coupling them with the fast system bus and PowerPC.

Until the CHRP OS and ROM are available, Tatung plans to sell Macs based on Motorola Computer Group's (800/759-1107, *www.mot.com/starmax/*) forthcoming StarMax II series, which feature faster system buses than on the current StarMax series (50MHz versus 40MHz) and internal SCSI connectors. These systems should be available later this spring.

"APPLE STEPS INTO THE YELLOW BOX"

continued from page 29

intosh side come world-class graphics and multimedia APIs: QuickTime, QuickTime VR and QuickDraw 3D, plus ColorSync (Apple's color-management technology) and some of the typographic features of QuickDraw GX. From Next, Apple will get Internet-based mail, messaging, directory, and security services built into the OS. The Yellow Box will also encompass WebObjects, Next's Web-application development tools, and Next's Enterprise Objects Framework (EOF), which makes it easy to access large corporate databases.

The Yellow Box is also built on the object-oriented OpenStep architecture, with capabilities the Mac OS has only hinted at. OpenStep provides prebuilt, reusable software objects—such as buttons, menus, and even more-complicated devices like text and image editors—that developers can assemble into applications far more quickly than if they had to create these objects from scratch. In the past, advanced Apple technologies have suffered from a lack of development tools. In this case, the tools may be a key strength.

Apple has also made a strong commitment to Java, saying that Yellow Box operating systems and emulators will run 100% Pure Java applications. Developers will also be able to call native Yellow Box functions from Java programs. Of course, the Yellow Box must be installed for the Java calls to work.

Whither Mac OS? None of this extends the reach of the classic Mac OS. Apple says it has firm Mac OS development plans through the year 2000. But while Rhapsody for PowerPC will run classic Mac applications through the Blue Box, the Blue Box will not appear in any other version of Rhapsody.

How the Yellow and Blue Boxes will coexist in Rhapsody for the PowerPC is not yet final, but some details are becoming clearer. Blue Box applications will run within a window on the Rhapsody desktop. The window will have its own menu bar, and users can expand the window to take over the entire desktop, if desired. It will be possible to cut and paste data between Yellow and Blue Box programs, but drag and drop will not work. Users will also be able to write scripts that call Yellow Box programs from within the Blue Box and vice versa.

The Yellow Box may one day become the superstar of operating systems, but as of now, it's just another punk itching to get in the game.

Apple's Yellow Box strategy spans two hardware platforms and four operating systems.

New Products

THE LATEST MACINTOSH RELEASES

Edited by Keith Mitchell

COMMUNICATIONS

See You, See Me

Three new videoconferencing cameras let you see who you're talking to.

• Panasonic's (201/348-7000, *www.panasonic.com/alive*) $199 EggCam includes a built-in microphone and offers 330-line horizontal resolution.

• The $299 TeleCam LT from Howard Enterprises (805/383-7444, *www.howent.com*) offers 330-line horizontal resolution, a built-in microphone, backlight compensation, and auto white balance.

• The $259 IK-M28A from Toshiba (714/583-3000, *www.toshiba.com*) includes 350-line horizontal resolution, auto white balance, and a tilt-and-swivel base.

Toshiba IK-M28A

56 Is a Magic Number

New 56-Kbps modems are sprouting up all over the digital landscape. Here are two new offerings in the superfast modem market.

• The $190 SupraExpress 56e Mac modem from Diamond Multimedia (360/604-1400, *www.diamondmm.com*) uses K56flex technology and includes upgradable flash memory.

• Two models of Global Village Communication's (408/523-1000, *www.globalvillage.com*) Teleport 56 give Internet users the choice between x2 and K56flex 56-Kbps standards. Each sells for $219.

DISPLAY

Monitors of All Sizes

There's something for everyone among these new displays.

• Sampo (770/447-1109) has released a 29-inch monitor with a 27-inch viewable area. The SM-72A1 is $1195 and includes a 10w stereo amplifier and two built-in speakers. Maximum resolution is 1024 by 768 pixels. Sampo also has a new 14-inch LCD monitor, the PD-50F, for $2895. The viewable area is 13.8 inches, its resolution is maximum 1024 by 768 pixels, and it can display 256 colors.

• Optiquest (909/869-7976, *www.viewsonic.com*) has a new 20-inch monitor, the Q100, which costs $1100 and offers a maximum 1600-by-1280-pixel resolution.

• The CPD-220VS is the new $899 multimedia display from Sony (408/432-1600, *www.sony.com*). It's a 17-inch monitor with a 16-inch viewable area, built-in speakers and microphone, and a maximum 1280-by-1024-pixel resolution.

• Apple Computer (408/996-1010, *www.apple.com*) has released the $1850 AppleVision 850 and $2000 AppleVision 850AV. The monitors have 19-inch viewable areas, a maximum 1600-by-1200-pixel resolution, and built-in color calibration that automatically adjusts for changes in ambient lighting. The 850AV includes built-in speakers with surround-sound support, a built-in microphone, and an output jack for headphones.

ENTERTAINMENT

Pick Your Chopper

If you've always wanted to fly a fully armed military helicopter, you could enlist; or you could check out NovaLogic's (818/880-1997, *www.novalogic.com*) flight-simulation game Werewolf vs. Comanche 2. The $45 game includes detailed environments and more than 60 missions to choose from. Players can also go head-to-head via modem or network connections.

One-way Ticket

If you're out for a wild ride, Brøderbund (415/382-4400, *www.broderbund.com*) has a new adventure game called The Last Express. The action is set in 1914 on a luxury train, where players explore the detailed 3-D environment, solve puzzles, and interact with various characters. The game costs $39.

Brøderbund The Last Express

GRAPHICS

The Next Dimension

Adobe Systems (408/536-6000, *www.adobe.com*) has released Adobe Dimensions 3.0, an upgrade to its vector-based 3-D software. Like previous versions, it converts vector graphics into 3-D objects, but it can now export bitmapped images as well. You can also wrap a vector or bitmapped image around a 3-D shape. The $199 package ships with bevel and texture libraries and 28 Type 1 fonts. Upgrades from previous versions cost $69.

Color Coordinated

No matter what kind of project you're working on, you don't want to use colors that clash. Palette Picker from Lightdream Design (805/481-3783, *www.lightdream.com*) helps you choose an appropriate set of colors for your project. You can view color sets in different patterns, and see the RGB and CMYK components of every color. The program costs $24.

Elemental Plug-Ins

Earth, wind, fire, and water can be yours with Fractal Design's (408/430-4100, *www.fractal.com*) new 3-D plug-ins for Ray Dream Studio and Ray Dream Designer. Four Elements, a $149 package, lets you create landscapes, atmospheres, bodies of water, and fire effects within Ray Dream software.

MULTIMEDIA

After Effects Full-Tilt

Cognicon (408/257-9040, *www.cognicon.com*) gives users the ability to animate 3-D models from within Adobe After Effects with Tilt. The $499 package includes six plug-ins: Camera, Far Light, File Object, Point Light, Simple Object, and Spot Light. Tilt shows changes in real time and is now available for Adobe After Effects 3.1 or later.

Be a Video Ace

Two of the industry's leaders in digital video bring you two new professional editing systems.

• Media 100's (508/460-1600, *www.media100.com*) new HDRfx Option for the Media 100 xs system lets video editors create effects in real time at a 2:1 compression rate. It includes 21 real-time transition effects and costs $7995.

• Truevision (408/562-4200, *www.truevision.com*) has released the Targa 2000 SDX, which adds support for the Serial Digital Interface standard and allows video editors to connect desktop video components, including digital cameras, monitors, tape recorders, and video switchers. The system costs $11,995; owners of the Targa 2000 DTX and RTX can upgrade for $2995.

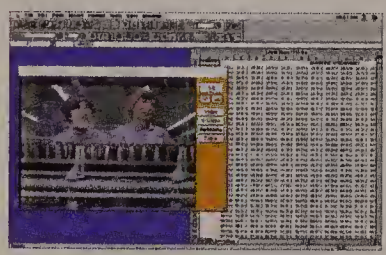
Desktop TV

Is your neck getting cramped from switching between the monitor and the television? The new TurboTV tuner card from IXMicro (408/369-8282, *www.ixmicro.com*), formerly Integrated Micro Solutions, lets you watch TV in a separate window on

continues

New Products

your screen while you're working in another application. The $169 PCI card can deliver 125 channels and is cable-ready.



IXMicro TurboTV

NETWORKING

Bridging the Gap

FCR Software (617/494-1300, *www.fcr.com*) can help you get around some of the limitations of Apple Remote Access and OpenTransport, with LinkUPPP 1.1. This $60 remote-access PPP client supports Open Transport and classic networking, and lets you simultaneously access Internet and AppleTalk services; the upgrade lets you work with Eudora and Netscape Navigator and improves AppleTalk performance. Users of 1.0 can upgrade free.

ONLINE

Hear the Web

The standards for multimedia on the Web keep getting raised. Two companies focusing on online sound have introduced their first products.

• Beatnik from Headspace (415/696-9400, *www.headspace.com*) lets Web designers use sound as an interactive tool. Web surfers can trigger MIDI sounds; change tempo, volume, and pitch; and turn music on or off with mouse events. The plug-in and beta editor are available for free download.

• Liquid MusicPlayer is the free, downloadable player component of Liquid Audio's (415/562-0880, *www.liquidaudio.com*) Web audio technology. The plug-in lets surfers preview CD-quality song samples on music-based Web sites while viewing artwork, lyrics, and notes.

World Wide Woof

Apple (408/996-1010, *www.apple.com*) has pulled the plug on Cyberdog development, but not before releasing a final upgrade to the OpenDoc-based Web browser. Available for free download from *www.cyberdog.apple.com* and on Macworld Online at *www.macworld.com/software/Index.Software.AppleSoftware.html*, Cyberdog 2.0 adds full-text e-mail search; the ability to add graphics, enclosures, and live links to e-mail messages; and support for multiple e-mail accounts and Netscape plug-ins.

Little Earthquakes

Shake up your Web site with Tremors, a $195 collection of 250 Macromedia Shockwave animations on CD-ROM from Ezone (800/929-0240, *www.ezone.com*). Tremors includes more than 20 categories of graphics, more than 200 Shockwave animations, and 50 animated GIFs, along with the Shockwave playback plug-in and instructions on how to use them. The average file size is 17K. You can download a free sample.

All News, All the Time

Stay current with the PointCast Network for Macintosh 1.0 broadcast service. PointCast (408/253-0894, *www.pointcast.com*) delivers news, weather, sports, and other information updates from the Web to your screen. The client software is available for free download, and the service is also free.

PRINTING

Lightning-Fast Lasers

Epson (310/782-0770, *www.epson.com*) is offering two new 600-dpi laser printers, the EPL-N1200 and the EPL-N2000. The $1099 EPL-N1200 prints at 12 ppm on standard letter- and legal-size paper. The $1899 EPL-N2000 prints at 20 ppm and can print on 13-by-19-inch paper for full bleeds of 11-by-17-inch spreads with registration and crop marks.

Parting the Color Sea

Magic Software (716/855-0295, *www.magicsoftware.com*) is giving prepress workers an alternative to creating color separations in Adobe Photoshop. Magic Separator LE is a Photoshop plug-in that offers enhanced RGB-to-CMYK conversion functions, including unsharp masking and gray component replacement. The $49 software can be downloaded from Magic's Web site.

Picture-Perfect

Forget film processing. Alps (408/432-6000, *www.alpsusa.com*) is offering continuous-tone color output in a 600-dpi printer that uses aspects of dye-sublimation printing. The good news? The Masterpiece MD-2300 costs only $799. The printer delivers 1200-by-600-dpi in black-only mode.

Alps Masterpiece MD-2300

STORAGE

CD Roulette

Access all your information quickly and easily with these two new CD jukeboxes.

• Plasmon's (612/946-4100, *www.plasmon.com*) D-Series jukeboxes include four or six 8× CD-ROM drives and can be configured with 4× writable CD recorders. The jukeboxes come in CD capacities of 120, 240, and 480; pricing for the base configuration, which holds 120 CDs, starts at $9995.

• Two new jukeboxes from Marcan (206/635-7477, *www.marcan.com*) have 8× drives, 50-disc trays, a SCSI-2 interface, and the ability to load and unload discs while the jukebox door is closed. The MC-1200 holds 200 CDs and costs $14,395. The $18,495 MC-1600 holds 600 CDs.

UTILITIES/TOOLS

Lock It Up

Get protection from prying eyes with these three new security products.

• The $80 PGPdisk from Pretty Good Privacy (415/572-0430, *www.pgp.com*) uses 128-bit encryption to securely store data and files on PowerBooks, desktop Macs, and networks. PGPdisk functions at the operating-system level to ensure that no unencrypted data is left on the disk.

• PGPfone 2.0 is Pretty Good Privacy's Internet and telephony security companion to PGPdisk. The $50 utility provides caller authentication and full-duplex support. The new version adds multiple speech compressors and two-way file transfer.

• Data Fellows (408/244-9090, *www.datafellows.com*) is now shipping its F-Secure SSH Client, a standard in the PC and Unix industries, for the Mac. The product secures data transmissions between Mac clients and Unix servers running F-Secure SSH for Unix. It costs $99 per workstation.

Computers in Flight

Tired of your PowerBook batteries' running out while you're trying to work on a flight? The PowerXtender adapter from Xtend Micro Products (714/699-1400, *www.xmpi.com*) lets you plug your notebook into the new in-seat power systems currently being installed by major airlines. The $99 adapter lets you run your PowerBook and recharge the batteries using the airplane power. It can also plug into a car's cigarette lighter.

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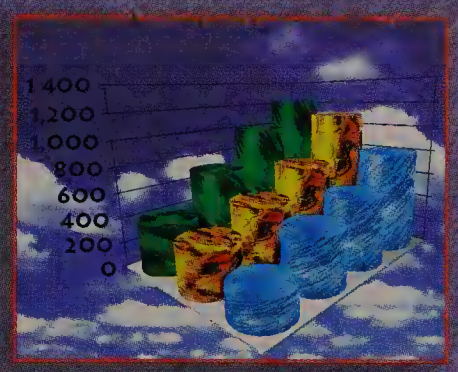

Imagine if you could save those charts as pictures, 3D objects or QuickTime™ movies ? You could use those charts in a presentation program, a video program or put them out on the Internet !

SURFBOARD SALES

Model	1995	1996	1997	1998	1999
Caffeine Overkill	3.2	8.3	17.1	24.3	36.9
WaveCrusher	5.0	12.7	14.3	22.1	29.7
Tsunami 550 GTi	7.4	14.2	16.8	24.9	34.0
OutOfControl 700/MB	11.1	34.5	61.2	76.7	88.1
Truemen Big Kahuna	2.2	4.1	31.8	60.5	66.3
Northern Impact II	12.0	22.5	27.8	34.8	42.1
HyperActive XV400	4.2	14.0	36.7	44.1	46.2
HyperActive XV7000	5.9	18.7	45.8	51.2	57.8
Terminator One	0.2	7.8	58.2	70.3	86.3
TOTAL:	51.0	129.0	251.4	328.7	402.1

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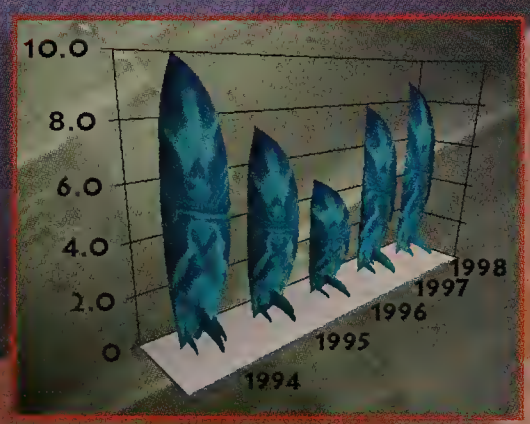

Edition

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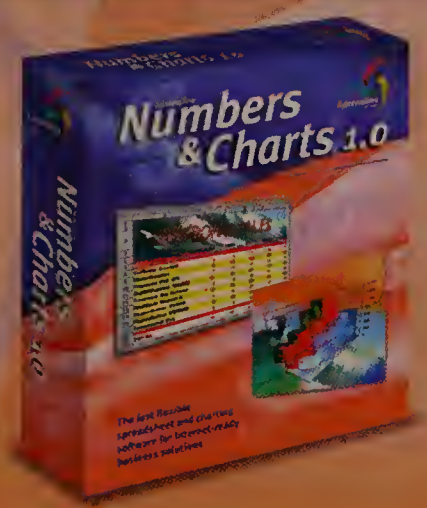

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- *Complete OpenDoc support*

System requirements

- *Macintosh with PowerPC processor*
- *System 7.5.3 or later*
- *16 MB of physical RAM*
- *5 MB of hard disk space*

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Reviews

Adobe Illustrator 7.0

SLIGHT UPGRADE MARKS A NEW BEGINNING FOR VENERABLE GRAPHICS APP

JOHN BLECK

DEPENDING ON WHOM YOU ASK, Illustrator 7 offers modest enhancements with a greatly improved interface, or it's the worst upgrade Adobe Systems ever spawned. As a longtime vector artist, I'm rather fond of Illustrator 7, and after suffering the haphazard interface and feature sprawls of versions 5 and 6, it's refreshing to see Illustrator return to the tight, logical design that was once the product's hallmark. I doubt artists will clamor to snatch up what amounts to a big housecleaning effort, but it's a much needed step in the right direction.

Less Familiar but Better

If you make your living as an illustrator, you know that a drawing application can't offer too many convenience features. It's absolutely essential that you be able to navigate and access tools with a minimum of effort so you can devote the majority of your concentration to the artwork. In this regard, Illustrator 7 may be initially detrimental; tools have moved, palettes have reorganized, and more than 100 shortcuts are new or different. If you are intimately familiar with Illustrator 6, prepare to enter some alien territory.

On the other hand, if you take the time to learn Illustrator 7, it's decidedly better than its predecessors. You can access every tool—bar none—by pressing a letter key. Some keys make perfect sense—pressing the R key selects the rotate tool—while others make no sense at all, like pressing the N key to cycle between the oval, polygon, star, and spiral tools. Still, Illustrator's tool keys are easier to remember and more comprehensive than Macromedia FreeHand 7's function-key shortcuts (see *Reviews*, February 1997). After you memorize Illustrator's shortcuts, you'll be able to switch between drawing, editing, and transforming without shifting your cursor a single pixel.

As I discussed in my preview of Illustrator 7 ("Illustrator's New Face," June 1997), the program's revamped interface more closely resembles Photoshop's look. Most navigation techniques have been standardized in the two programs, and Illustrator 7 follows Photoshop's example of multipanel palettes, which helps keep on-screen clutter to a minimum. Both programs share commands and keyboard shortcuts for object alignment, color application, grouping, stacking, and layering. As a person who spends two hours in Photoshop for every one in Illustrator, I find the new interface more logical and predictable than its predecessor's.

Other minor enhancements add up to one big improvement. You can now see

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Outstanding ★★★★★= 9.0–10.0 Very Good ★★★★= 7.0–8.9 Good ★★★= 5.0–6.9 Flawed ★★= 3.0–4.9 Unacceptable ★= 0–2.9

the origin point for a transformation and even move it to a new location by dragging. Illustrator 7 also reinstates version 5's ability to rotate multiple times around a fixed origin. You can activate palette options from the keyboard, tab from one palette value to the next, and nudge values up and down by pressing the arrow keys. These actions aren't implemented quite as consistently as they are in Photoshop—you can't press the tab key to hop from palette to palette—but they come in mighty handy. And you can perform simple arithmetic operations in most option boxes, an improvement over Illustrator 6's limited implementation of this feature.

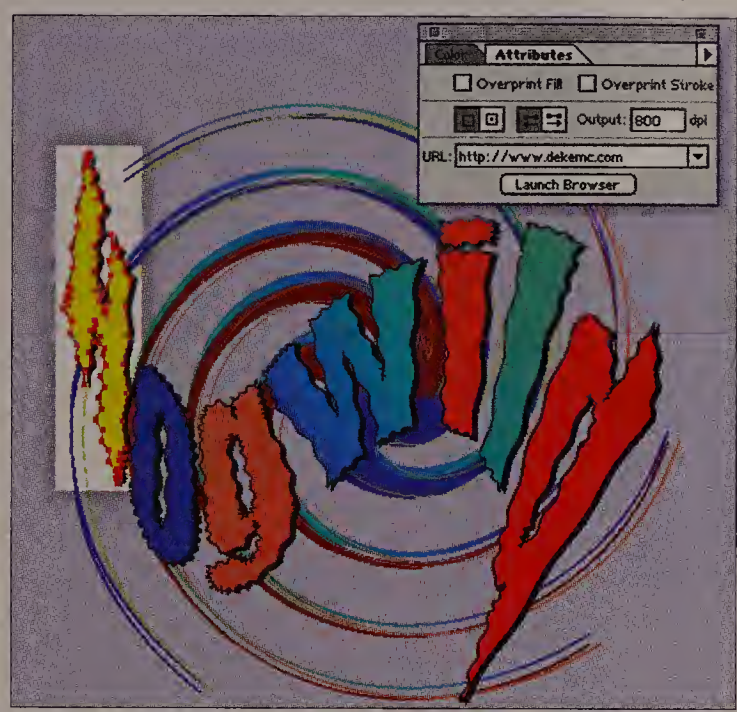
Illustrator 7's so-called context-sensitive pop-up menu is the lone interface disappointment. Intended to offer quick access to common commands by control-clicking within any tool, it's really context-ignorant. It disregards the active tool, always beginning with the shortcuts for Undo and Clipboard operations—which most first-year Macintosh users already know—and it offers commands out of context, even when they should be dimmed. Finally, the pop-up menu offers no provision for switching to the layer that contains a selected object, the Photoshop equivalent's best feature. If you want quick access to commands, you're far better off learning the shortcuts.

New Features, Missed Opportunities

Beyond the interface, only a few scattered enhancements grace Illustrator 7. Feature-wise, I suspect this version will go down in the record books for the things it can't do.

- The autotrace tool now recognizes color images, but there's no way to set color tolerance, and the tool still draws just one path at a time.
- You cannot reshape blends, as you can in FreeHand, Corel's CorelDraw, and Deneba's Canvas.
- All three competitors offer more and better special-effects functions, while Adobe leaves effects in the hands of plug-in developers.
- FreeHand continues to reign as the king of styles, particularly in its unique ability to search and replace graphics.
- Though plentiful and capable, Illustrator's Pathfinder operations remain tucked away in a remote submenu. We need a palette; we need previews.
- Illustrator 7 lacks Photoshop 4's Navigator and Actions palettes. Illustrator still zooms and scrolls in giant steps, and scripting is not an option.

But Illustrator 7 is not entirely devoid of new features. Its most significant addition, image linking, allows you to tag TIFF, JPEG, and other files rather than parsing the pixels into Illustrator's native and comparably inefficient PostScript. (For the record, FreeHand has been able to link TIFFs since the late 1980s.) As a result, you can import and trace a TIFF file without Illustrator's slowing to a dead crawl and ballooning the file size. In my testing, Illustrator handled tagged images every bit as quickly as FreeHand.



All Over the Map After assigning a URL to an object from the Attributes palette, you can export an illustration as a GIF image map. Illustrator automatically generates an HTML file with client-side tags. Unfortunately, although you can assign URLs to irregularly shaped objects (such as the yellow *H*), Illustrator saves rectangular hot spots (shown in white) that may overlap one another.

Internet-friendly Illustrator 7 offers a 216-color Web palette, support for URL objects and image maps, and RGB-definable colors. It's also easier to switch between gray-scale, RGB, and CMYK color spaces. Alas, the color-space-conversion filter doesn't address gradients, which you have to modify manually.

And on the subject of colors, prepare yourself for a complete redesign, mostly for the better. Adobe has added all sorts of keyboard tricks and drag-and-drop conveniences; gradients in particular are much easier to edit. If you currently spend a lot of time organizing colors and tints in Illustrator 6's Paint Styles palette, you'll take exception to the new Photoshop-style free-form Swatches palette. With some practice, though, you'll find yourself coloring more quickly and accurately in Illustrator 7.

The new product also includes a grid, vertically aligned text capabilities, and a reshape tool that lets you stretch paths along an angled axis. The latter takes a while to get used to—I'm still grappling with it even after several months—but it makes an interesting addition to the traditional scale tool.

In my June preview, I incorrectly stated that Illustrator 7 would include an upgraded version of Adobe's automatic tracing utility, Streamline. The mistake is mine, but I must say that given the dearth of new features in version 7, it amazes me that Adobe doesn't plan to sweeten the deal with this addition.

Macworld's Buying Advice

If you've been using Illustrator long enough to perform most operations without thinking, Illustrator 7 is a shocker; it's only a slight exaggeration to say that absolutely everything's different. Do the program's improvements make it worth learning all over again? If you measure an upgrade purely by its features, the answer is no. But if you care about productivity, then Illustrator 7 is a big step forward.

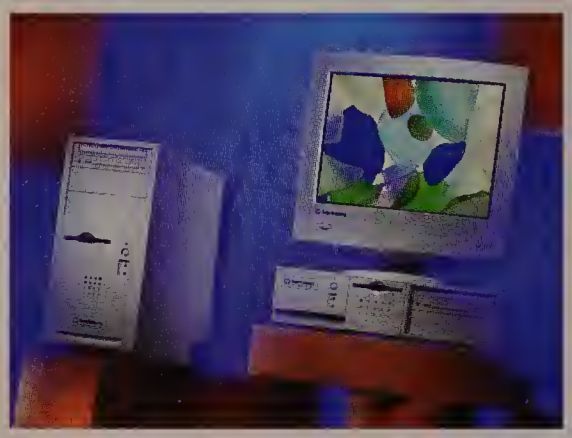
Illustrator 7 offers a more logical working environment than FreeHand 7, particularly if you spend a lot of time in Photoshop. But FreeHand offers many more features, including some—editable blends, graphic styles, and multipath autotracing—that make Illustrator's equivalents look puny. In the final analysis, FreeHand is the better program, but Photoshop users will feel more at home in Illustrator.—DEKE McCLELLAND

RATING: ★★★★/7.2 **PROS:** Improved interface shares elements and shortcuts with Photoshop 4; improved TIFF handling; new RGB capabilities. **CONS:** Steep learning curve for longtime users; still-weak autotracing, blending, special effects, and styles. **COMPANY:** Adobe Systems (415/961-4400, *www.adobe.com*). **LIST PRICE:** $595.

PowerCenter Pro Series

POWER COMPUTING LINE REDEFINES MIDRANGE

POWER COMPUTING'S NEW POWERCENTER Pros render the distinction between high end and midrange largely irrelevant. Though they target midrange users, these machines offer the performance you'd expect from Macs much higher up the food chain, consistently outpacing more expensive machines with comparable CPUs and fewer features. The PowerCenter Pro 210 even rivals its high-end cousin, the PowerTower Pro 225, which hasn't had much competition until now.



KEVIN CANDLAND

PowerCenter Pro 210, left, and PowerCenter Pro 180.

In their base configurations, the PowerCenter Pro 180 and 210 cost $2095 and $2395, respectively—not bad for systems with a 60MHz bus, 1MB of upgradable cache, a 16× CD-ROM drive, 16MB of RAM, 2MB of VRAM (upgradable to 4MB), and a 2GB drive.

In its tradition of combining innovation and thrift, Power recycled a modified design for the Apple Catalyst motherboard from its discontinued PowerTower 180. Catalyst (also used in the Power Mac 7200) runs at 60MHz, up from the usual 50MHz. This isn't breakthrough technology, but it *is* clever and effective: faster buses enable the CPU to work more efficiently.

The systems we tested were slightly upgraded from the base models to include 32MB of RAM, 4MB of VRAM, and Seagate's AV-optimized Barracuda hard drive. The PowerCenter Pro 180 outran Apple's Power Mac 7300/180 by 13 percent and costs about $100 less than a similarly configured 7300 (which ships with only 256K of cache, a 12× CD-ROM drive, and a 45MHz bus).

Although the PowerCenter Pro 210 isn't supposed to compete with high-end Tsunami-based machines, it outpaced the Power Mac 9600/200 by 2 percent overall in Macworld Lab tests. The PowerCenter is also more expandable than its Power Mac competitor. The 9600 comes with just 512K of cache (soldered onto the board) and a 12× CD-ROM drive—although it ships with 8MB of VRAM and six PCI slots (to the PowerCenter Pro's three). And the 9600 costs almost $1000 more than the PowerCenter model.

Both PowerCenter Pros include an upgradable CPU (although no CPU upgrade cards exist at this time) and a 20-MBps Adaptec SCSI-3 card with internal and external connectors (in addition to the standard external and internal SCSI-1 connectors), letting you add faster hard drives both inside and outside the case. Although this unique dual-SCSI chain approach can be confusing, it offers great flexibility. PowerCenter Pros ship with all the standard Mac I/O ports, too.

The video circuitry in the PCI riser card offers 3-D and 2-D acceleration using the Rage II chip from ATI Technologies, a $350 value. Although the PowerCenter Pro's desktop enclosure doesn't have any free drive bays, the minitower includes two free 5.25-inch bays. One disadvantage: there's not much room to maneuver between bays.

Macworld's Buying Advice

You won't go wrong with either PowerCenter Pro system; both are more forward-looking than most Macs today, including high-end systems. Although both are great values, the 210 offers a mere 5 percent performance improvement over the 180 and costs $300 more—the 180 is a slightly better buy in the configurations we tested. If you need peripherals, though, consider Power Computing's $2995 PowerCenter Pro 210 bundle, which includes a 17-inch monitor, a 33.6-Kbps modem, and 32MB of RAM—an especially good value.—TOVA FLIEGEL

PowerCenter Pro Series

POWERCENTER PRO 180 ★★★★/8.6

POWERCENTER PRO 210 ★★★★/8.5

PROS: Top performance; 1MB upgradable cache and 60MHz bus; great price. **CONS:** Tight drive bay spacing. **COMPANY:** Power Computing (512/388-6868, *www.powercc.com*). **LIST PRICE:** $2544 Pro 180, $2844 Pro 210 (both as tested: with 32MB of RAM, 2GB AV-capable hard drive, 4MB of VRAM, minitower enclosure).

Macworld LAB TEST

PowerCenter Pros Rival High-End Systems

Longer bars are better. Results are times as fast as a Centris 650 (Centris 650 = 1.0).
Products are listed from fastest overall to slowest overall.

	Overall Score	CPU-Intensive	FPU-Intensive	Disk-Intensive
PowerTower Pro 225	9.2	9.4	13.4	3.5
PowerCenter Pro 210	**8.9**	**9.0**	**12.9**	**3.6**
Power Macintosh 9600/200	8.7	8.9	12.1	3.5
PowerTower Pro 200	8.5	8.4	12.7	3.5
PowerCenter Pro 180	**8.3**	**8.4**	**11.7**	**3.7**
Power Macintosh 7300/200	7.7	7.9	11.5	2.3
Power Macintosh 7300/180	7.2	7.3	10.9	2.2

Behind Our Tests For information on our methodology, see "Super Mac Values," May 1997.—Macworld Lab testing supervised by Mark Hurlow

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Power Macintosh 8600/200

HASSLE-FREE CASE ELIMINATES UPGRADE ULCERS

DOES THE THOUGHT OF UPgrading your Mac give you a headache and the idea of installing a PCI card give you pains in your side? The Power Macintosh 8600/200 could be just what the doctor ordered. This tower's supercool, sleek case offers one of the most easily upgradable designs yet. But don't let its good looks fool you: if you're hunting for a speed demon, the Power Mac 8600/200 isn't it.

Disappointing Speed

This 200MHz RISC-based CPU tower is *finally* shipping after months of delays, despite reports in other publications of earlier delivery. Unfortunately, Apple's much-anticipated flagship Power Macintosh performed miserably in Macworld Lab's benchmark tests, lagging behind the midrange Power Computing PowerCenter Pro 180 (also reviewed in this issue). The 8600/200 squeezed past the Power Macintosh 6500/250 (reviewed elsewhere in this issue) but couldn't compete against the Power Macintosh 9600/233 or the PowerTower Pro 225. Luckily, Apple's design makes modest performance increases possible.

This system's major drawbacks include its relatively stingy 32MB of RAM, a smallish 2GB hard drive, and a minimal 256K cache. To realize top performance, you'll need to add more memory, install a faster hard drive, *and* increase secondary cache to at least 512K. In Macworld Lab tests, performance improved up to 25 percent when we increased the cache to 1MB. Apple's removable 200MHz 604e chip makes swapping the CPU an option, too. A 233MHz processor is slated for fall availability.

SUZANNE ROADY

Excellent Design

Apple did some serious housecleaning inside this system. Handy lime-green buttons, levers, and handles make upgrading a snap . . . literally. Simply push a button, pull two levers, lift a handle, and voilà—you get full access to the machine's uncluttered interior. It's easy to reach the six free DIMM and two free VRAM sockets, three free PCI slots, and single externally accessible drive bay. Apple has eased drive installation by eliminating the plastic brackets required as a separate purchase for Power Mac 9500's and 8500's—a metal one is included within the bay.

Apple has targeted this Power Mac to publishing gurus and video creators, but its VRAM, digital-video I/O, and video-capture capabilities are better suited for midrange digital video and media authoring. High-end home users and small offices can benefit from the 8600/200's built-in video (as well as its Iomega Zip drive, 12× CD-ROM drive, and Ethernet capabilities), but intense video creation requires more than three free PCI slots. Serious multimedia buffs will be disappointed with the 8600/200's lagging performance, too.

Macworld's Buying Advice

The pricey Power Mac 8600/200 offers average performance and decent video options; its greatest asset is its unique case. Alas, the 8600/200 doesn't pack enough horsepower into its stylish shell; Power Computing's PowerCenter Pro 180 offers a much more appealing alternative. Although the Power Center Pro's video capabilities are optional add-ons, that less-expensive tower offers punchier performance and comparable upgrade options.—ALLYSON BATES

RATING: ★★★★/8.0 **PROS:** Unique industrial design; clean interior; built-in video. **CONS:** Slow performance; minimal PCI slots; expensive. **COMPANY:** Apple Computer (408/996-1010, *www.apple.com*). **LIST PRICE:** $3200 as tested (32MB of RAM, 2GB hard drive, 256K cache).

Macworld LAB TEST

Power Mac 8600/200's Speed Doesn't Match Its Great Design

Longer bars are better. Results are times as fast as a Centris 650 (Centris 650 = 1.0).
Products are listed from fastest overall to slowest overall.

	Overall Score	CPU-Intensive	FPU-Intensive	Disk-Intensive
Power Macintosh 9600/233	9.4	9.6	13.6	3.6
PowerTower Pro 225	9.2	9.4	13.4	3.5
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PowerCenter Pro 180	8.3	8.4	11.7	3.7
PowerTower Pro 180	7.8	7.9	11.3	3.4
Power Macintosh 8600/200	**7.8**	**7.9**	**11.7**	**2.5**
Power Macintosh 6500/250	7.1	7.4	9.9	2.9
Power Macintosh 8500/180	6.7	6.6	10.3	2.4

Behind Our Tests For information on our methodology, see "Super Mac Values," May 1997.—**Macworld Lab testing supervised by Mark Hurlow**

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Power Mac 6500, 5500

FAST LOW-END SYSTEMS MAKE THE GRADE

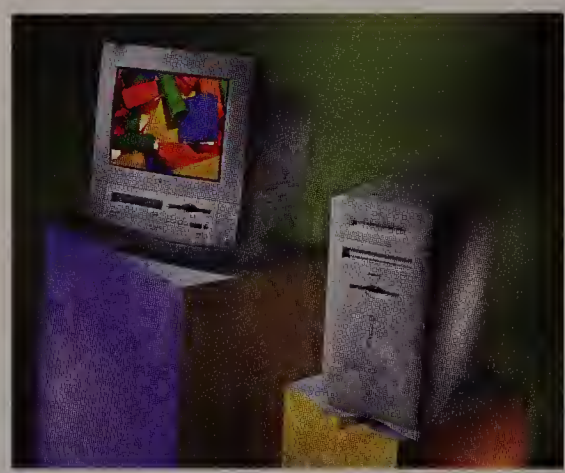
APPLE'S NEW POWER MACS ARE no bargain, but they *do* sport superfast CPUs hidden inside a multimedia-packed tower for small-office/home-office users and an all-in-one configuration for schools. The Power Macintosh 6500 and 5500 both offer blazingly fast performance with all the necessities. Alas, you'll pay the price for these hot new systems.

The 6500/250 is the fastest shipping 603e-based system ever in Macworld Lab's benchmark tests (see "Fast CPUs for the Low-End Market"). In fact, with this much horsepower, the 6500 comes close to the performance level of many 604e-based machines. In addition to the 250MHz model, the 6500 also ships in a 225MHz configuration (which we could not obtain in time for testing); 275MHz and 300MHz systems are slated to ship in June.

The 6500's wide, round-edged tower is tightly sealed to keep out curious young hands; but since Apple includes all the trimmings—including a Zip drive, a 12× CD-ROM drive, a 4GB hard drive, 2-D and 3-D graphics accelerator boards, and a 33.6-Kbps modem—there's little reason to pry it open. Apple also includes a hefty SOHO software bundle.

As with its predecessor, the Power Mac 6400, advanced multimedia capabilities complement this home machine's plush features. The 6500 also adds new built-in video and NTSC video-out capabilities. To boost performance, Apple includes 48MB of RAM and 256K of secondary cache. Apple intends the 6500 to be a self-contained box with minimal upgradability—it sports just a single serial port and two free (but nearly impossible-to-reach) PCI slots, and no externally accessible drive bays. If you're looking to save a few hundred dollars, Apple also offers the 6500/250 in a scaled-down $2300 version with less RAM (32MB) and a home software package.

The Power Macintosh 5500/225—the 6500's all-in-one counterpart—provides such a dramatic boost to the education market's offerings that it displaces Power Computing's PowerBase 180 as our Editors' Choice (see *Mac Superguide*, in this issue). Sold exclusively to schools, this compact desktop with an integrated 15-inch monitor breaks speed barriers—its 225MHz 603e chip dramatically outperforms similarly configured systems.



KEVIN CANDLAND

Power Mac 5500/225, left, and Power Mac 6500/250.

To integrate multimedia into the classroom experience, Apple includes a 12× CD-ROM drive, stereo sound, 2-D and 3-D acceleration, and Internet-access software. Additional goodies include video-out capability for NTSC TV connection, and a built-in video card that enables classrooms to record video from video cameras, VCRs, and laser discs.

Macworld's Buying Advice

Some Power Mac 6500 and 5500 users have reported problems with video images, cache, and software installation (see *www.macworld.com/daily/daily.1311.html*). Even after Apple resolves these problems, you'll still want to consider your options—and your finances—before choosing the powerful Power Mac 6500/250. You can save almost $700 with an upgradable, similarly configured PowerBase 240, and although you won't get the same incredible performance of the 6500/250, your wallet won't feel so empty. The 5500/250, however, is a dream for educators hunting for a new system. Affordably priced and well-equipped, the 5500 goes straight to the head of the class.—ALLYSON BATES

Power Macintosh 5500/225

RATING: ★★★★/8.1 **PROS:** Affordable and speedy; advanced multimedia capabilities; integrated monitor. **CONS:** Sold only in education market; not upgradable. **COMPANY:** Apple Computer (408/996-1010, *www.apple.com*). **LIST PRICE:** $1999 as tested.

Power Macintosh 6500/250

RATING: ★★★★/7.5 **PROS:** Outperforms even some 240MHz systems; built-in Zip drive; 2-D and 3-D acceleration. **CONS:** Difficult to upgrade; expensive. **COMPANY:** Apple Computer (408/996-1010, *www.apple.com*). **LIST PRICE:** $2600 as tested.

Macworld LAB TEST

Fast CPUs for the Low-End Market

Longer bars are better. Results are times as fast as a Centris 650 (Centris 650 = 1.0). Products are listed from fastest overall to slowest overall.

	Overall Score	CPU-Intensive	FPU-Intensive	Disk-Intensive
Power Macintosh 8600/200	7.8	7.9	11.7	2.5
Power Macintosh 6500/250	**7.1**	**7.4**	**9.9**	**2.9**
Motorola StarMax 3000 MT603e-240	6.8	7.1	9.2	2.8
Power Macintosh 5500/225	**6.8**	**7.0**	**9.3**	**2.8**
Power Computing PowerBase 240	6.4	6.5	9.1	2.5

Behind Our Tests

For information on our methodology, see *Super Mac Values*, May 1997.—**Macworld Lab testing supervised by Mark Hurlow**

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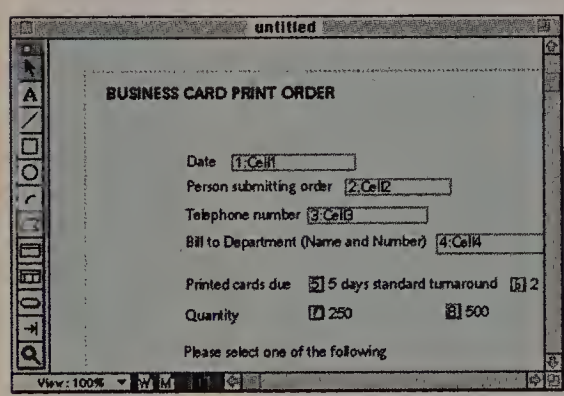
Circle 201 on reader service card

Electronic Forms Software

FORMS SOFTWARE MADE SIMPLE—MORE OR LESS

DOES YOUR OFFICE CALL ITSELF paperless but still use paper forms—outdated, mass-produced, and blurry from too many trips through the copier? If so, take a look at three programs designed to bring forms online. FormTyper, OmniForm, and Informed Designer let you update, customize, and otherwise improve expense reports, invoices, work requests, and other office forms fare.

Visioneer's FormTyper 1.0, designed to work in conjunction with the company's PaperPort scanner, is a simple way to convert hard-copy forms into electronic versions that you save as is—blank—or fill out before printing, faxing, or e-mailing. Caere's OmniForm 2.0 converts hard-copy forms but also lets you create new forms and edit forms once they're scanned in. And Shana's Informed Designer 2.0 eschews scanned forms altogether in favor of robust, built-from-scratch forms design.



Built to Order Informed Designer's plethora of editing tools let you build just about any form imaginable.

You Get What You Pay For

FormTyper is the simplest to use of the three. You just scan any blank form, fill in the blanks, maybe make some notes in the margin (this $400 dinner was necessary, *really*), and print it or save it as a template. You can then distribute the electronic form via other PaperPort links to your printer, fax modem, or e-mail program.

But you get what you pay for, and $20 doesn't get you much. FormTyper lacks editing tools; the tab fields, where you enter your data, often overlap or don't align with the form's background text labels; and it misses some tab fields entirely. I tried using FormTyper's annotation tool rather than the tab fields to fill out my forms, but my annotations were truncated when I printed the forms. And forget about its recognizing check boxes or "comb" fields, those squares that hold credit-card numbers and zip codes.

A Step Up in Quality . . . and Price

Caere's OmniForm 2.0 (actually the first version for the Mac) does a great job of placing tab fields correctly and aligning them on scanned forms; editing tools make adjustments easy. It even recognizes those check boxes and comb fields that vex FormTyper. If your order form has a table, OmniForm's Table function can calculate one field's value based on information entered in other fields. You can get fancy and embellish your table or form with pull-down fields, mandatory-entry fields, and fields with minimum or maximum values; a handy Scrapbook stores commonly used elements such as logos. If you get confused, the Scan Assistant can step you through the process. (Just make sure OmniForm has a driver for your scanner—some of the newer models aren't supported, and the drivers aren't on Caere's Web site.)

OmniForm's strangest feature is a fickle Page Setup command: you can't access it, or its all-important page-orientation setting, in Fill mode—only in Design mode. Online help was useless, since it wouldn't open; Caere's tech support recommended specifying the page orientation before scanning in a form. Complex forms—particularly those with tiny text and tightly packed lines and boxes—are another source of trouble, causing slowdowns and confusing the OCR engine. If you have a complex form, you may just want to build it from scratch.

This Program Means Business

Dominating the field is Shana's robust, feature-rich Informed Designer. Some of the notable additions to version 2.0 are support for Web-based forms (via an HTTP plug-in) and the ability to distribute the latest version of a form automatically via an FTP server. The only thing Informed Designer can't do that the others can is accept hard-copy forms via a scanner. Keep that in mind if you have several forms to convert, since creating forms can be time-consuming.

Informed Designer's polish is evident in its editing tools; they include layout grids and guides, alignment commands, a long list of pre-scripted buttons, palettes of predefined table and field styles, and drawing tools. You can attach documents to a form, and the forms you create work on both Windows machines and Macs.

The package includes one copy of Informed Filler, a fill-in-the-blanks version with no design capabilities. It's also available separately for $195.

Macworld's Buying Advice

If you've been toying with the idea of digitizing your forms, I suggest bypassing FormTyper—it's just too underpowered. A better bet for first-time forms jockeys, or users who want to scan existing forms, is OmniForm. If you're *really* serious about electronic forms, though, the feature-rich Informed Designer can't be beat. If you have an earlier version of it, the wealth of new features and refinements make the latest version a worthwhile upgrade.—SUZANNE COURTEAU

FormTyper 1.0

RATING: ★★/3.8 **PROS:** Inexpensive; simple to use; handy annotation feature. **CONS:** No editing tools; capricious field placement; annotations frequently truncated; requires PaperPort. **COMPANY:** Visioneer (510/608-0300, www.*visioneer.com*). **LIST PRICE:** $19.95.

Informed Designer 2.0

RATING: ★★★★/7.3 **PROS:** Powerful forms design; supports Web-based forms; cross-platform; automatic updating via FTP servers; supports attachments. **CONS:** Doesn't work with scanned forms. **COMPANY:** Shana (403/433-3690, *www.shana.com*). **LIST PRICE:** $295.

OmniForm 2.0

RATING: ★★★/5.7 **PROS:** Accurate field placement and form fidelity; supports a variety of field types; good support for calculations and tables; Scrapbook. **CONS:** Slowed performance on complex forms; quirky Page Setup command. **COMPANY:** Caere (408/395-7000, *www.caere.com*). **LIST PRICE:** $149.

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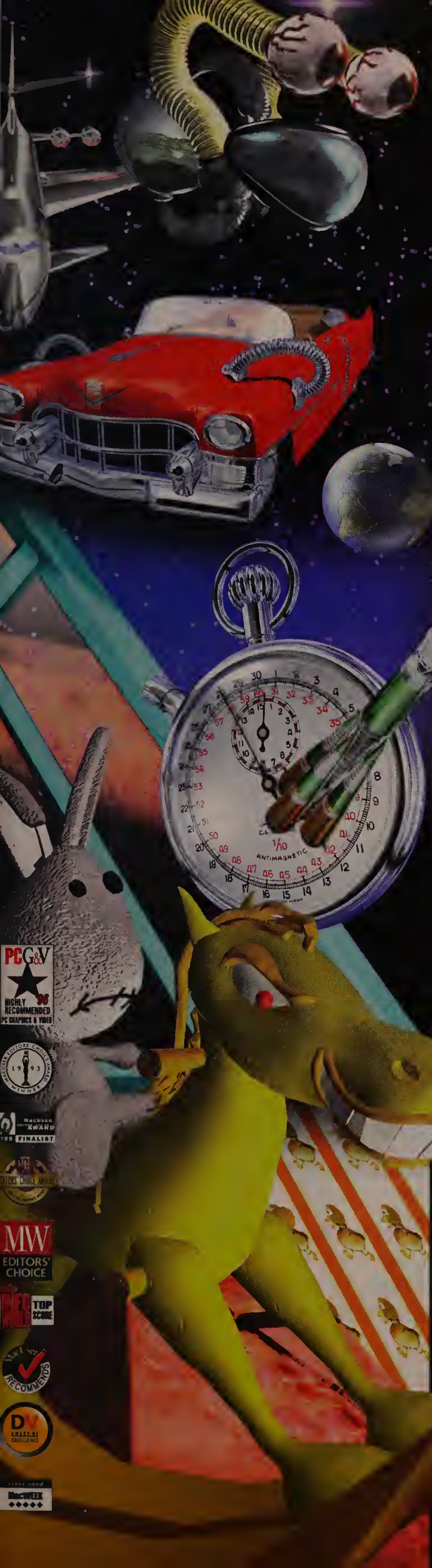

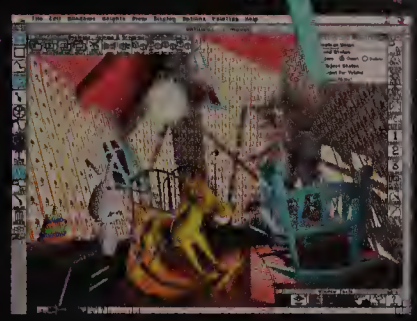

Fred Lewis and Thalia Georgopoulos of Moving Media, San Francisco, California, design and create contract illustrations and animations for broadcast, games, architecture, the web, CD ROMs and other media for many different clients. They have by now modeled nearly anything you can think of. How do they do it?

"We are artists in the business of converting our imaginations into alternate realities. Computer technology has made it possible for us to create images and animations that were never possible before. form•Z is one of the few programs that has enough of the tools we need, to allow us to follow our vision. With form•Z we spend less time dealing with technical limitations and more time being creative."

Fred Lewis and Thalia Georgopoulos, Moving Media

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Add as many **layers** as you need, work with floating point **precision** using simultaneous **graphic** and **numeric input**. If you're unhappy with your new design, **unlimited undos** are always at your fingertips.

RenderZone

When you're done modeling, you can use **RenderZone**'s state of the art shader technology to produce your photo realistic images at impressive speeds. Or you can transfer your models smoothly into your favorite animation program, using **form•Z**'s extensive import/export formats. Flexibility of this caliber has made **form•Z** the most effective modeling complement to many popular animation programs.

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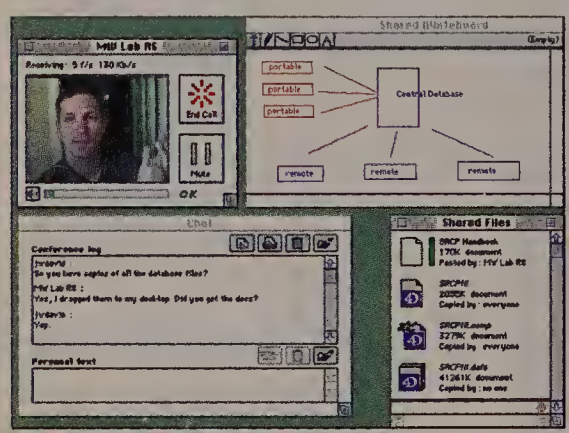
Videoconferencing Kits

CONNECTIX VIDEOPHONE, APPLE VIDEOPHONE KIT, ENHANCED CU-SEEME: STILL IN THE SLOW LANE

DECADES AFTER THEY WERE PREdicted, videophones still seem futuristic. Three updated videoconferencing products from Apple, Connectix, and White Pine try to bring that vision a little closer to reality, with varying degrees of success. But if your goal is to replace face-to-face meetings with videoconferencing, beware: unless you have a high-bandwidth network, you'll probably find desktop conferencing more an amusing novelty than an empowering tool.

What You Get

Apple VideoPhone Kit 1.5 consists of conferencing software and a Panasonic color video camera that plugs into the Mac's digitizer (a Power Mac with AV capabilities is required). Connectix VideoPhone 2.01 is software that works with a video camera plugged into the Mac's serial port. Another software-only option is Enhanced CU-SeeMe 2.0, a beefed-up, color-capable version of the popular freeware application.



Here's Looking at You Apple VideoPhone does a good job of delivering video and audio over LANs.

Basic operation is the same for all three. To place a call, you enter the IP address of the person you're calling (Connectix VideoPhone offers a useful directory of such addresses). That person needs to be connected at that IP address and have compatible conferencing software running—the Apple and Connectix products can interoperate, but for CU-SeeMe the other party also needs CU-SeeMe. All three let you adjust the size of the video window (standard size is 1/16 of a 15-inch monitor). You can see yourself and the other person, though eliminating the self view improves performance.

How They Fared

After installing the packages on two 32MB Power Mac 8500's—a process that took less than 20 minutes for each—I tested them on an isolated Ethernet network and over the Internet, connecting via ISDN and a 28.8-Kbps modem.

All three did well enough over Ethernet to be usable for LAN-based conferencing. Apple VideoPhone reached 10 to 14 frames per second in a 160-by-120-pixel window. The video, while by no means broadcast quality, was smooth and watchable. Audio quality was excellent, allowing full-duplex conversation without echoing or clipping. Like the others, Apple VideoPhone could synchronize the audio and video only at higher speeds.

After I found a workaround to a conflict with QuickTime Conferencing 1.5, Connectix VideoPhone also delivered watchable video at around 10 frames per second. With a Color QuickCam, the video was jerky and slightly fish-eyed; even with a regular video camera, quality was slightly worse than Apple VideoPhone's. And although audio quality was generally good, occasional clipping occurred. Enhanced CU-SeeMe was on par with Connectix VideoPhone in terms of video quality, but it trailed slightly in audio quality.

Over lower-speed connections, the results were more disappointing. Apple VideoPhone and Connectix VideoPhone were all but useless for transmitting video at 28.8 Kbps, delivering only a jerky sequence of still images; performance over ISDN was marginally better but still erratic. Enhanced CU-SeeMe, because it's optimized for low-bandwidth environments, actually produced usable video over both lower-speed connections. The video tended to be blurred and uneven, but it was smooth enough to maintain the illusion of continuous motion.

All the products fared better with audio-only conferencing over the Internet, nearly matching the quality available over a LAN. Apple VideoPhone was particularly effective, offering natural-sounding, uninterrupted audio.

Enhanced Cu-SeeMe has a chat facility, a whiteboard, and support for cross-platform, one-on-one, and multiparty conferences. Apple VideoPhone offers a simple shared whiteboard, a chat window, a file-transfer utility, and support for both one-on-one and multiparty conferencing. And Connectix VideoPhone offers a chat window, supports one-on-one and one-to-many conferences, and lets you save conferences as QuickTime movies. Connectix's interface is the best of the bunch, though Apple's offers easier configuration.

Macworld's Buying Advice

If you're expecting television-quality pictures and sound over your 28.8 modem, you'll be seriously disappointed with these products; in low-bandwidth environments, they're little more than hobbyist diversions. Enhanced CU-SeeMe is the most usable over slow connections. In higher-bandwidth environments, Apple VideoPhone Kit offers good, basic functionality at a modest price. And once the bugs are worked out, Connectix VideoPhone may be a good solution for those with non-AV Macs on a high-speed network.—J.W. DAVIS

Apple VideoPhone Kit 1.5

RATING: ★★★/6.9 **PROS:** Easiest to configure; good performance over a LAN; modest price. **CONS:** Poor low-bandwidth video performance. **COMPANY:** Apple Computer (408/996-1010, *www.apple.com*). **LIST PRICE:** $279.

Connectix VideoPhone 2.01

RATING: ★★★/5.7 **PROS:** Nice interface; cross-platform. **CONS:** Protocol bug; poor low-bandwidth performance. **COMPANY:** Connectix (415/571-5100, *www.connectix.com*). **LIST PRICE:** $99 (software only).

Enhanced CU-SeeMe 2.0

RATING: ★★★/6.4 **PROS:** Cross-platform; best low-bandwidth performance. **CONS:** Problem with built-in digitizer; least impressive audio quality. **COMPANY:** White Pine Software (408/446-1919, *www.wpine.com*). **LIST PRICE:** $69 (software only).

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- Power FPU
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- CD-ROM & HD Tool Kit PE

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PowerPC™

Mac OS

For more information on where to purchase the C500LT, call 1-888-625-UMAX or visit us at http://www.supermac.com

C500LT/180 SPECIFICATIONS:

MODEL NAME	C500LT/180		
Processor Type	603e/180MHz	Hard Drive	1.2Gbyte
Form Factor	Slim Desktop	Drive Bays	3 total
RAM	16MB	Total PCI Slots	2
Max. RAM	144MB	Video Memory	1MB
Level-2 Cache	256K	ADB Ports	1
CD-ROM Speed	8X	Serial Ports	2

*Monitor not included. Price and features subject to change without notice.

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Photoshop Filters

EYE CANDY, PHOTOTOOLS MAKE SPECIAL EFFECTS SIMPLE

PHOTOSHOP EXPERTS ROUTINEly conjure up amazing visual effects, but duplicating them isn't always easy. Two new collections of plug-in filters for Adobe Photoshop 3.0.4 and later, Alien Skin's Eye Candy 3.0 and Extensis's PhotoTools 1.1, make it easier to produce (and reproduce) eye-catching effects. Eye Candy offers a greater variety of effects (20 plug-ins to PhotoTools' 8) and a more straightforward approach, while PhotoTools feels more polished and offers a text plug-in that's a great improvement over Photoshop's built-in text support.

A Bigger Box of Candy

The successor to Alien Skin's popular Black Box 2.0 (see *Reviews*, November 1995), the Power Mac–only Eye Candy 3.0 adds 11 new filters: Antimatter, Chrome, Fire, Smoke, Perspective Shadow, Fur, Star, Weave, Jiggle, Squint, and Water Drops. New controlling options enhance some of the original 10 filters (Carve, Cutout, DropShadow, Glass, Glow, HSB Noise, MotionTrail, Swirl, and Inner and Outer Bevels), and those filters that removed a selection after completing their tasks now retain the selection when used with Photoshop 4.0. All the Eye Candy filters are effective and practical.

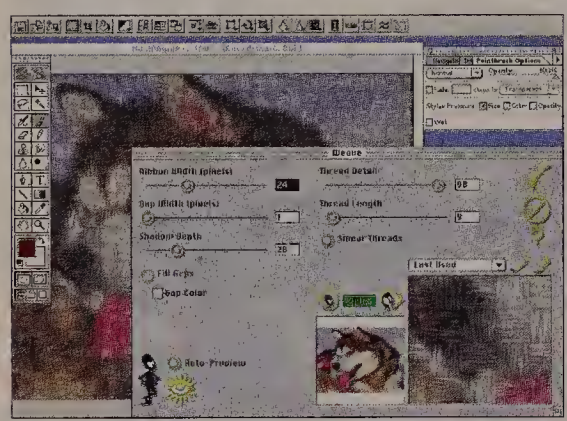


Image Weaving Eye Candy's Weave filter produces thatched and latticework effects.

For every Eye Candy filter, a dialog box displays a zoomable, resizable preview of the image. But although the previews are larger than those of native Photoshop filters, they constitute a relatively small percentage of total dialog dimensions. And because you can't resize them independently of the dialog box, there's a limit to how big they can get.

Eye Candy's controls are easy to use, encouraging the experimentation you'll need to master the filters' subtleties. Each filter comes with an assortment of presets so you can get started right away, and all the filters are compatible with Photoshop 4.0's script-recording Actions (PhotoTools supports Photoshop 4.0 in general, but it doesn't support Actions).

Text, Bars, and Tips

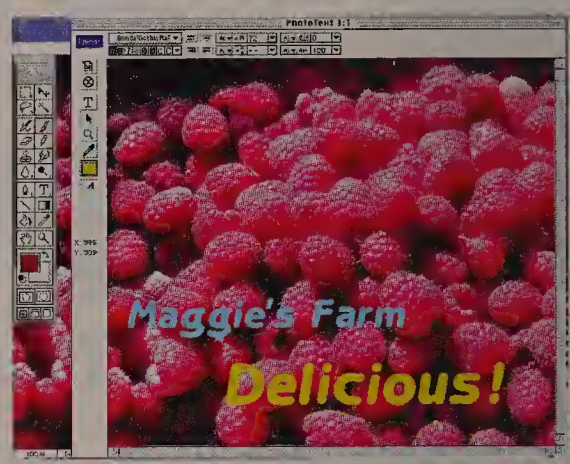
Of the two collections, PhotoTools 1.1 is the more ambitious. In addition to filters for glows, beveling, embossing, and drop shadows, PhotoTools includes the aforementioned PhotoText; Intellihance Lite, an RGB-only version of Extensis's color-correction filter; PhotoTips, a compilation of useful hints you can access from within Photoshop; and PhotoBars, a set of plug-ins for customizing Photoshop's tools and features.

PhotoBars is a handy feature that gives you one-click access to any of Photoshop's tools. To build tool bars and floating palettes, you simply create a tool bar and select the Photoshop functions you wish to appear as buttons; you can also use PhotoBars' predefined tool bars and palettes. The SmartBars function records your actions in Photoshop and builds button palettes containing the commands in the sequence. Although SmartBars is useful, it doesn't record everything; for example, it recognized some Photoshop filters (such as Watercolor and RoughPastels) but not others (such as Ocean Ripple and Glass). Neither could it record third-party filters (such as Eye Candy's) or even PhotoTools' own effects filters. However, version 1.0's tendency to produce white artifacts over the working image (see *Reviews*, February 1997) has been resolved.

Although it doesn't match Eye Candy in sheer number of effects, PhotoTools offers versatile filters that give you several options, and its resizable dialog boxes sport easy-to-use controls and exceptionally large previews. Most important, all the PhotoTools filters produce excellent results. But the best of the lot is PhotoText; it lets you enter and place text elements directly on the preview—which you can enlarge to the size of the Photoshop image itself—so you can position them precisely. When you're done, PhotoText applies the text in a separate layer so you can reposition it. Anyone who has wrestled with text elements in Photoshop will appreciate this filter's elegance.

Macworld's Buying Advice

If you're a Photoshop pro looking for usable, reliable image-manipulation tools with a practical bent, Eye Candy 3.0's straightforward, businesslike approach makes it an excellent choice; PhotoTools 1.1's customizing options and tip sheet make it more suitable for the less experienced Photoshop user. But for first-rate tools that help novices unlock the power of Photoshop and give professionals a productivity boost, you can't go wrong with either package.—CARLOS DOMINGO MARTINEZ



Textwright PhotoTools' PhotoText plug-in lets you type text elements directly on a preview of the working image; its editing tools let you see the effects of different typefaces and font sizes.

Eye Candy 3.0

RATING: ★★★★/7.9 **PROS:** Filters are practical and easy to use. **CONS:** Previews could be larger. **COMPANY:** Alien Skin Software (919/832-4124, *www.alienskin.com*). **LIST PRICE:** $199.

PhotoTools 1.1

RATING: ★★★★/7.8 **PROS:** Good mix of useful filters and customizing options; excellent text tool. **CONS:** SmartBars feature is only selectively smart. **COMPANY:** Extensis (503/274-2020, *www.extensis.com*). **LIST PRICE:** $99.95.

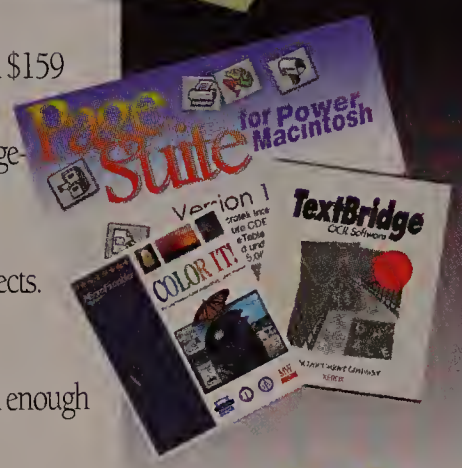
The Little Color Page Scanner That Thinks It's An Office Manager.

Scan in Beautiful 24-bit Color. Save, Annotate or Route Documents to Fax, E-Mail Software and Printers.

If you're buried under a mound of documents you have to sort through, save, file and route every day, then get the new, very affordable *Microtek Color PageWiz*™ page scanner. Color PageWiz captures photos, drawings, business cards, magazine articles, reports, legal briefs — *virtually any business document* — and places them right into your Macintosh.

Aggressively Priced, Yet Fully Loaded.

Only Microtek could offer a color page scanner with such superb image quality for just $159 and still pack it with some spectacular software. For example, Macintosh models include *Xerox TextBridge*® OCR software,* *MicroFrontier's Color It!* the 32-bit image-editing and paint software and *Microtek's new PageSuite*,™ easy-to-use, drag-n-drop software for routing scanned documents to your fax or e-mail software. PageSuite for Macintosh also allows you to add annotations, highlights, enhancements or special effects.



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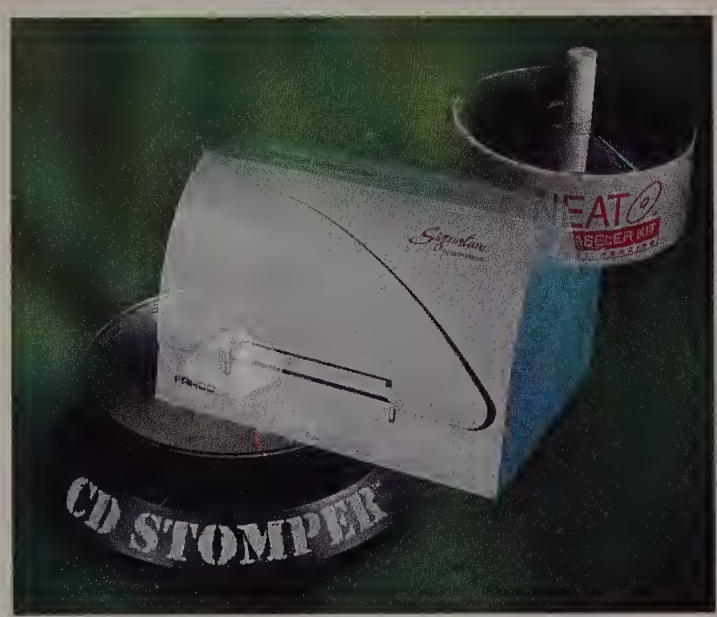
Circle 105 on reader service card

CD-R Labeling Solutions

PRINTER, LABEL KITS HELP YOU LOOK LIKE A PRO

As prices for CD-Recordable (CD-R) drives drop to new lows, many individuals and businesses have started regularly pressing their own CDs. Bridging the gap between handwritten CD labels and high-cost (and high-quantity) professional labeling services, three new products help you produce more attractive CDs. Fargo Electronics' Signature CD color ink-jet printer prints directly onto custom CD media; the Neato CD Labeler and Stomp's CD Stomper make and apply labels to any CD.



SUZANNE ROADY

High-Priced Dedicated Printer

The Signature CD Color Printer is much like a typical color ink-jet printer except that it prints exclusively on CD-Rs, jewel-case inserts, and CD booklets. Output quality is very good, as is print speed: final CDs print in about 4.5 minutes. When printing on Fargo's special printable-surface CD-Rs, the ink dries quickly and is smudge resistant.

When you're ready to print, you press a button to open the Signature's feed tray, place a printable-surface CD into the tray's circular cutout, and print your image from a graphics or page-layout program. Plastic clips in the feed tray hold CD inserts and booklets firmly in place.

Page Setup allows you to specify media type, ink (color or monochrome), print quality, and dithering (optimized either for standard graphics and text, or for photographic images). Fargo plans to add additional driver options soon, including color matching, image rotation, and a high-resolution (600-by-300-dpi) print mode.

The Signature's light weight (under 9 pounds) and small size (7.5 inches high by 10.5 inches wide by 10.5 inches deep) make it convenient for almost any desktop. It offers separate serial and parallel ports to accommodate both Macintosh and Windows users, and includes drivers for both platforms. According to Fargo, you can connect the printer to a third-party autoloader to print multiple CDs.

Inexpensive Alternatives

If you can't justify a dedicated printer just for CD media and inserts, the CD Stomper and the Neato CD Labeler Kit can help you design and print circular paper labels and affix them to your CDs. Both kits include layout templates and artwork for designing labels, a set of 100 CD labels, and a plastic base used to apply labels to CDs.

Although the Neato does an adequate job of positioning labels, the CD Stomper does it better. The single-piece Stomper base makes it simple to center labels precisely. Slipping a label over the positioning pole in the center of the base keeps the label from moving; you then place the CD on the same pole and press down, affixing the label. The Neato, on the other hand, is a two-piece device: a base and a separate positioning pole. Since nothing holds the label in place, the label is free to shift and curl. After placing the label on the base, you put a CD on the positioning pole, slip the pole into the hole in the center of the base, and press down.

The software bundle for the Neato CD Labeler Kit includes CD Face, a design program for CD labels and inserts; templates for CD labels, inserts, and booklets; and more than 80 background images. If you have a favorite graphics or layout program, you can use the graphic templates to design your labels. Otherwise you're stuck with the usable but sometimes frustrating CD Face.

Rather than offering a design program, the CD Stomper relies on templates—assuming that you already have a graphics or layout program (such as Adobe Photoshop, Illustrator, or PageMaker; QuarkXPress; Macromedia FreeHand; or Microsoft Word). The CD Stomper currently offers just one style of label sheet: white, two-up, CD-ROM. The Neato's three-up CD labels come in white, silver, and gold backgrounds (you can order refills in clear or any of a dozen colors), and include several insert and tray-liner pages.

Macworld's Buying Advice

If you produce a lot of CDs, the Signature CD Color Printer is a good investment. Although the output doesn't rival glossy, professionally printed CDs, the Signature creates quality images. At $9.50 apiece, Fargo's printable CD-Rs are only a few dollars more than normal blanks.

Of the two labeling kits, the CD Stomper is clearly the better product. Its software is simple to use, and the label base works flawlessly. Neato's software pales in comparison with typical design programs, and the included label base doesn't hold a candle to the CD Stomper.—STEVEN SCHWARTZ

CD Stomper

RATING: ★★★/6.3 **PROS:** Well-designed label mounter; excellent templates. **CONS:** Extremely limited label styles; no design program. **COMPANY:** Stomp (714/250-6771, *www.labelcd.com*). **LIST PRICE:** $79.95.

Neato CD Labeler Kit

RATING: ★★/4.6 **PROS:** Good selection of templates; includes colored labels; variety of refill supplies. **CONS:** Uninspired label applicator; weak software. **COMPANY:** Neato (203/466-5170, *www.neato.com*). **LIST PRICE:** $79.95.

Signature CD Color Printer

RATING: ★★★/6.7 **PROS:** Good print quality and speed; simple to use; handles inserts, booklets, and printable CDs. **CONS:** No printing templates; high-quality print mode not yet implemented. **COMPANY:** Fargo Electronics (612/941-9470, *www.fargo.com*). **LIST PRICE:** $1295.

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Circle 30 on reader service card

eMate 300

AT LAST, IT'S NEWTON DONE RIGHT

DEVICES BASED ON NEWTON technology have had a rocky past, but Apple's gotten nearly everything right with the eMate 300. With a form factor more like that of a small laptop than a PDA, the eMate's classroom-targeted design could serve just as well for many adults.

This four-pound wonder fits well in a backpack, and its clamshell opens to reveal a keyboard and a 480-by-320-pixel

ARNOLD TIOSEJO

gray-scale backlit screen. A stylus receptacle resides above the keyboard (this *is* a Newton device, after all), near the volume and screen-contrast controls. The sides of the case sport a single PC Card slot, a headphone jack, an infrared transceiver, and one serial/AppleTalk port. It has 3MB of user RAM and runs a little faster than the MessagePad 130.

Some adults were put off by the eMate's innovative industrial design—including swoopy curves and a dark-green translucent case—but kids loved it. Smart touches include an integrated nonslip handle, and rubberized stylus holders on either side of the screen. The eMate also automatically saves your work and turns itself on when you open the lid. An internal rechargeable NiCd battery powers the eMate for more than 24 hours of continuous use, although using PC Cards or the screen's backlight drains the battery faster.

Appropriately for kids, the eMate's high-impact plastic case can withstand punishment that might total a PowerBook. I picked it up by the screen more than once and even accidentally knocked it off my desk without damaging it.

Built-in NewtonWorks software includes a word processor, spreadsheet, drawing program, and graphing calculator. Oddly, you can't use handwriting recognition in NewtonWorks (although shareware extensions let you do so). You also get the usual Newton utilities: Notes, Dates, and People. The eMate uses the Newton OS 2.1, and I found no software compatibility problems.

Apple provides facilities for beaming NewtonWorks documents to a teacher's eMate for grading, and you can set up one eMate to be shared among several students, with each kid getting his or her own password-protected space. It's easy to transfer or back up your work to a desktop computer (either Mac or Windows) via a serial connection or AppleTalk. With the included Newton Internet Enabler, NetHopper, and a PC card modem, you can even browse the World Wide Web with your eMate. Several third parties also offer e-mail packages.

Once you add a few commercial software packages, though, you may find yourself running out of RAM (which the eMate—like all Newton devices—uses for both memory and storage); Internet access software in particular takes up a fair amount of space. Apple should include more flash RAM with the eMate, although you can always buy a flash RAM storage card if you're willing to sacrifice the PC Card slot and forgo a modem.

Macworld's Buying Advice

I put the eMate into the hands of dozens of people, from kids to adults. Every single person played with it a bit, then said, "I want one!" The eMate may be meant for kids, but it would work just as well for adults on business trips: you can write, e-mail, fax, and access the Internet. Apple seems to have misjudged the eMate's utility, initially restricting sales to its educational customers—for whom the $799 price may be a bit high. The eMate offers much of the same functionality as the MessagePad 2000 (see *Reviews*, July 1997), and with the added cost of a keyboard, the MessagePad 2000 pales by comparison. The eMate 300 is an amazing, delightful device. I want one, too.—TOM NEGRINO

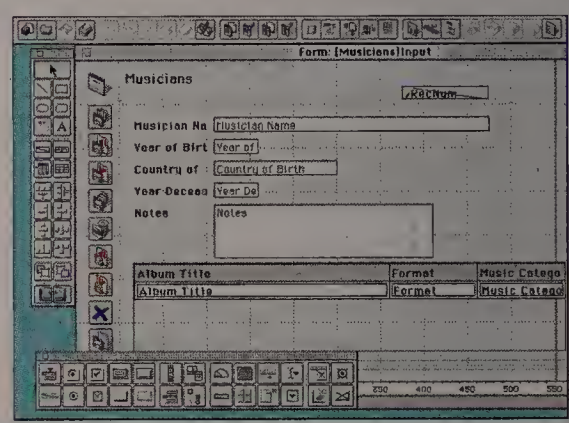
RATING: ★★★★/7.7 **PROS:** Great design; rugged; fun to use. **CONS:** Needs more built-in RAM; pricey for its target market. **COMPANY:** Apple (408/996-1010, *www.apple.com*). **LIST PRICE:** $799.

4th Dimension 6.0

CLASSIC RELATIONAL DATABASE DOES WINDOWS AND THE WEB

LEAPFROGGING FROM VERSION 3.5 to version 6.0, ACI US's relational database has received its most significant upgrade in nearly a decade. Version 6.0 adapts 4th Dimension (4D) to the world of cross-platform and Web-oriented computing: it generates database code for Windows 95 and NT as well as the Mac, and it automatically converts 4D forms to HTML. The resulting product is easier to program quickly than large-scale SQL-for-the-Mac powerhouses, such as PowerSoft's PowerBuilder, but more powerful and programmable than small-office favorites such as Claris FileMaker Pro.

Among version 6.0's enhancements are an advanced forms wizard and a better-designed debugger window for watching object and table methods execute. The new HTML capabilities and inter-



Buttoned Up 4D's design environment is easier to use than this profusion of icons would suggest.

nal server mean clients can use a Web browser for easy access to 4D's powerful searching and reporting tools, and site managers can update the databases with minimal effort (all changes to 4D forms appear immediately in the HTML representation). Version 6.0 also incorporates the server parts of 4D Web SmartServer, a collection of forms utilities, Web interface builders, and server functions. For additional Web-specific tasks, Foresight's (817/731-4444, *www.fsti.com*) NetLink/4D handles the details of CGI and Java interfaces; Pacific Data Management's (408/283-5900, *www.pdm-inc.com*) PDM Internet Tools supports SMTP, FTP, POP3, and low-level TCP/IP calls.

Because 4D generates browser-read-

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System Requirements: Any Macintosh with a 68040 or higher microprocessor, 8MB RAM, color monitor and CD-ROM drive. Also accelerated for Power Macintosh.

able HTML forms and allows standard Web browsers to manage basic TCP/IP access automatically, you can make 4D your Web server simply by choosing that option from a menu. A collection of examples shows you how to add jiggling graphics and other popular home-page features to your otherwise coolly professional database presentation.

If you already have a 4D database and a bit of forms-design practice, you can create a satisfactory Web site based on your existing files in a day. Since version 6 makes all your existing database forms accessible from the site, all you have to do is decide what's public and what's private. ACI US has pulled off the database-architecture feat of making users accessing 4D from the Web look like just another type of client, without sacrificing 4D's power as a Mac database or its easy links to minicomputers and mainframes.

Longtime 4D users will feel right at home in this expanded environment—plug-ins, extensions, and add-on packages are a hallmark of ACI US's approach—but the scope of the options developed over 4D's history can be overwhelming compared with the relative simplicity of FileMaker Pro. And 4D's Web functions can be difficult to master, though the examples and hand-holding make key tasks easier than in, say, FileMaker Pro using EveryWare's Tango. But an extensive tutorial makes the learning curve easier, and at the end lies a heavy-duty database with security, excellent relational-design integrity, and serious transaction handling.

Macworld's Buying Advice

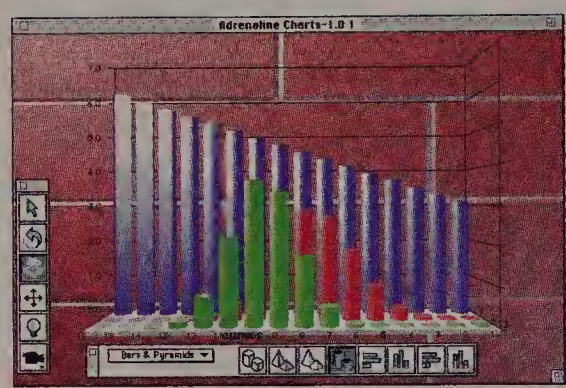
The complete 4D show—which includes the older 4D Calc, 4D Write, and 4D Draw along with the new Windows-aware SDK—can cost several thousand dollars, but the basic version is at its lowest price ever. (The just-released 4D Desktop, which bundles 4D Compiler and the 4D Insider tool kit, has a street price of $499.) 4D 6.0 is the clear Mac choice for businesses that need both access to huge databases and a reliable Web setup.—CHARLES SEITER

RATING: ★★★★/8.1 **PROS:** Great database adaptation to the Web; Windows 95 and NT support; easy links to mainframe data. **CONS:** Longer learning curve. **COMPANY:** ACI US (408/252-4444, *www.acius.com*). **COMPANY'S ESTIMATED PRICE:** $299.

Numbers & Charts

SPREADSHEET PARTS SHOW THE PROMISE OF OPENDOC

ADRENALINE SOFTWARE'S NUMbers & Charts 1.0.1—a pair of OpenDoc components for spreadsheets and graphing—heralds a new type of software. Once you start using Numbers & Charts (N&C), you'll think of Microsoft Excel as the final elaboration of the old-style approach to spreadsheets, and N&C as the beginning of a new model whereby Web technologies and Apple's own systems advances (AppleScript, OpenDoc, and QuickDraw 3D) make analysis and communication faster and easier than ever.



Premium Palettes Adrenaline's Charts lets you select a 3-D chart type from one palette while controlling shading and orientation with the other.

Numbers is the spreadsheet—or to use OpenDoc parlance, the worksheet editor used to produce document-embeddable, spreadsheet-style parts—and Charts is the graphing component. Don't fret if all this terminology sounds foreign; the N&C manual offers a brisk exposition of OpenDoc basics to familiarize novices with component software (see "OpenDoc: Now the Hard Part," *News*, March 1996, for more background).

Numbers bears a certain family resemblance to Claris's discontinued Resolve, including a similar set of computation functions and similarly admirable speed: Numbers performed my PowerPC statistics spreadsheet test nearly twice as fast as Excel 5.0. A well-designed formatting palette makes editing fast and simple; beyond the basics, it also includes a slick Smart AutoFill function. Numbers lacks a few useful Excel-like features (copying from one cell and pasting to a range, for example), but you'll quickly develop substitutes.

The fun begins when you select a chunk of a Numbers worksheet and drag it into an open Charts document. Charts lets you define colorful backgrounds and easily enhance your data's bars and lines with PICT graphics, 3D Metafile (3DMF) images, or even animations. Charts offers a nice assortment of business chart types and a superior collection of shading, lighting, and viewing tools.

Using Charts tools and Numbers data, you can quickly create graph styles ranging from austere 2-D plots to garish color animations. Charts lacks the most numerically faithful representation of data—the single-color scatterplot—but its eye-catching capabilities are more suitable for creating charts for meetings or the Web than for hard-core statistics or mathematics applications, anyway.

Adrenaline has chosen a competition-heavy market—there are plenty of quality Mac graphing packages, and Excel and ClarisWorks cover both ends of the worksheet market. Wisely, Numbers & Charts plays well in the existing spreadsheet world and offers plenty of new twists. If you drag an Excel worksheet into a Numbers document, it opens correctly; macros require separate translation but formulas convert at once. You can save N&C parts directly to HTML and create instantaneous Web pages from your data—a more useful skill these days than producing polar plots or programming in Visual Basic. Even better still, N&C can run alongside Netscape Navigator 3.0 on a humble 16MB system, something the outsized Excel can't ever again hope to claim.

Macworld's Buying Advice

If you don't need much hand-holding, work daily with the Web, and want an alternative to Microsoft Excel, Numbers & Charts is the answer to your spreadsheet and charting needs. As an impressive demo of OpenDoc's possibilities (and those of its follow-on technologies planned for Rhapsody), this package shows you why developers felt the radical component-software approach was worth pursuing.—CHARLES SEITER

RATING: ★★★★/7.3 **PROS:** Fast calculations; flashy charts; HTML formatting. **CONS:** Missing minor features; requires OpenDoc and basic understanding of component software. **COMPANY:** Adrenaline Software (418/658-9909, *www.adrenaline.ca*). **LIST PRICE:** $149.95.

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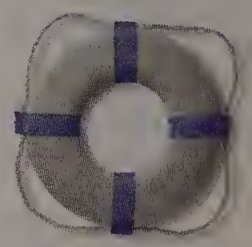

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Circle 76 on reader service card

StyleScript 3.5

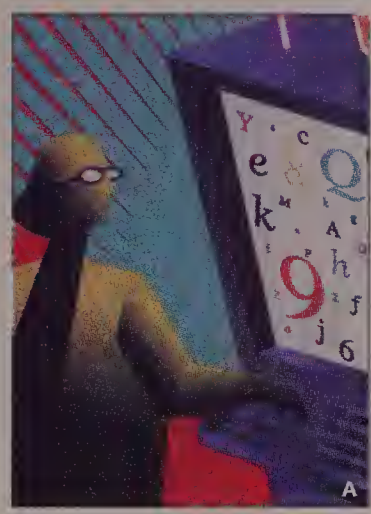
POSTSCRIPT SOLUTION WORKS . . . FOR SOME INK-JETS

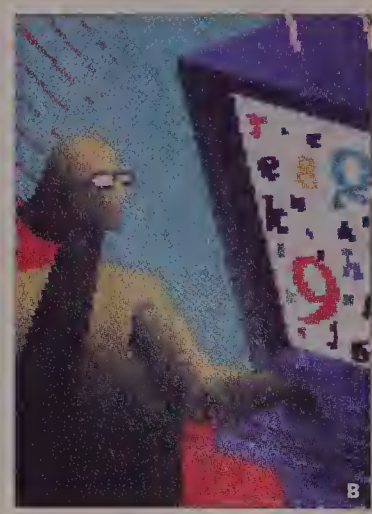
DON'T GET ME WRONG—I LOVE my Apple Color StyleWriter Pro. It suits my home-office printing needs, offering quality suitable for the occasional letter, party invitation, and picture of my cat. But it doesn't offer the ability to print PostScript. Enter Infowave's StyleScript 3.5, the long-awaited product whose ads show rags-to-riches conversions of PostScript ink-jet printouts and promise "true" Adobe PostScript printing on your Apple, Hewlett-Packard, or Epson printer. What's missing from the ad is a quick explanation that QuickDraw printers already do a decent job of printing PostScript images and fonts from within most applications—especially if you have Adobe Type Manager installed. It's only if you use a page-layout package *and* import EPS images that StyleScript is worth its $100 price.

StyleScript takes a chunk of your system memory and creates a virtual PostScript engine, mimicking in software what PostScript printers do with firmware. To install, choose your QuickDraw printer model from a list. The Chooser displays an extension called StyleScript Server in lieu of your normal printer driver.

I created a drawing with Adobe Illustrator 6 using multiple colors, a selection of PostScript fonts, and some skewed and rotated text, and saved the image in Illustrator EPS format. Clicking the print button, I waited for my PostScript masterpiece to appear. I was duly impressed with both the print speed and the quality of the printout. Every fine detail remained intact, and the colors appeared very close to their on-screen proxies.

To experience the horror of the "before" version, I reselected the standard Color StyleWriter Pro driver. To my surprise, the ugly duckling version of my drawing turned out to be nearly identical to the StyleScript printout. A quick call to Infowave's friendly and efficient tech support staff clued me in to the fact that most modern illustration packages do a decent job of re-creating your PostScript image using QuickDraw. I also had ATM Deluxe installed, which accounted for my smooth, crisp fonts. It was only when I imported my EPS images into another application (such as QuarkXPress or Adobe PageMaker) that I experienced jaggy text and graphics when printing to a non-PostScript printer. Enabling StyleScript transformed the image back to smooth lines and crisp text.





Not for Everyone QuickDraw printers do a decent job printing files directly from Adobe Illustrator or similar illustration programs (**A**), but they don't fare as well once the images are imported into QuarkXPress (**B**). StyleScript helps bring the image back into shape (**C**) despite its slightly coarse dither pattern.

Macworld's Buying Advice

If you place EPS images into a page-layout package and own one of the supported ink-jet printers, StyleScript's price is money well spent. If most of your PostScript printing comes from within the application where you create your artwork, save your dough: StyleScript won't improve your output dramatically.—MATT CLARK

RATING: ★★★/6.9 **PROS:** Smooths EPS images and type placed into page-layout packages; easy to install and use. **CONS:** Works only with selected printers; doesn't enhance images or type from most apps. **COMPANY:** Infowave (604/473-3600, *www.infowave.net*). **LIST PRICE:** $149.

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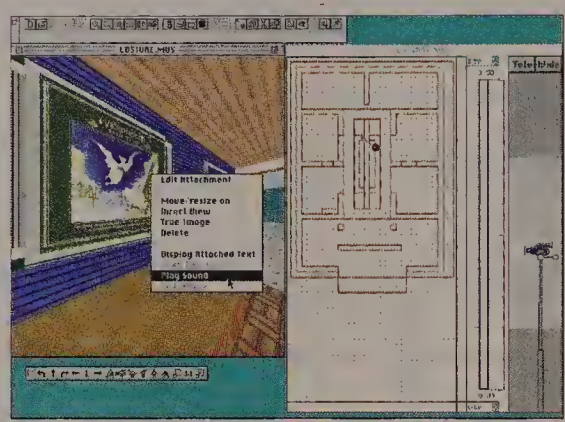
Virtual Home Space Builder 2.0

VRML 2.0 AUTHORING PROGRAM HAS LIMITED MODELING FEATURES

HAVE YOU EVER NOTICED THAT some technologies score consistently high on the hype meter but never catch on in the real world? Virtual Reality Modeling Language is one such beast. VRML's evangelists have long preached that it will transform the Web by replacing static 2-D pages with navigable 3-D spaces. It hasn't happened—partly because VRML browsers tend to be flaky and hard to use, and partly because crafting 3-D spaces is a lot harder than knocking out HTML pages.

ParaGraph's Virtual Home Space Builder (VHSB) 2.0.4 tries to simplify the space-building process, combining a fast, easy-to-learn authoring environment with support for the multimedia enhancements in VRML 2.0. But while VHSB is useful for some tasks, its limitations and interface annoyances keep it from being a must-have tool for VRML authors.



Virtual Listening Room This virtual music store lets you listen to clips by double-clicking on the CDs whose covers hang on the walls.

In VHSB, you build your virtual world by drawing walls and boxes in the floor-plan view. Adding textures to surfaces or adding images to walls is a simple matter of dragging and dropping from the Decorator window, the Finder, or any application that supports drag and drop. Straightforward controls make it easy to control the vantage point and camera position, and you can record a walk-through that users can play back. VHSB renders scenes quickly, even on 680X0 Macs. The CD comes with an extensive library of images, textures, MIDI music files, movies, and numerous prebuilt spaces—some furnished, some empty and awaiting your touch. (ParaGraph's Web site offers a $29, Mac-only version that lacks the clip art and prebuilt spaces.)

VHSB isn't a full-blown 3-D modeling program like Macromedia's Extreme 3D or Specular's Infini-D; rather, it goes head-to-head with Virtus's $159 3-D Website Builder (see *Reviews*, February 1997). VHSB has the edge in VRML support, but it doesn't have as many modeling tools as 3-D Website Builder—you're limited to drawing planes and boxes. 3-D Website Builder also supports a wider variety of 3-D shapes and includes a large library of prebuilt objects.

But what VHSB lacks in modeling, it makes up for in multimedia capabilities. With the Attachment command, you can specify that an event occur when a user double-clicks on an image. Such events include playing a QuickTime movie, sound, or MIDI music file; opening a high-resolution version of an image; or going to a specific Web page. (3-D Website Builder supports only the last option.)

VHSB's user interface is generally straightforward but occasionally infuriating. For example, to drag an element to a new location, you must first choose the Move/Resize On command. As soon as you deselect the element, the command is turned off; to move something else, you have to choose the command again. And to resize a graphic, you choose that command and drag the upper-right selection handle; you can't drag just any handle, as you can in almost every other graphics-oriented program.

Macworld's Buying Advice

Virtual Home Space Builder 2.0.4 isn't up to building richly detailed 3-D scenes containing complex shapes. If you need more-complex virtual worlds, 3-D Website Builder is a better bet (but be aware that it doesn't support VRML 2.0's multimedia capabilities). VHSB is best suited to creating museum-like spaces—simple, minimally furnished rooms with walls on which to hang pictures.—JIM HEID

RATING: ★★★/6.4 **PROS:** Fast; reasonably priced; easy to use. **CONS:** Limited modeling features; some interface frustrations. **COMPANY:** ParaGraph (408/364-7700, *www.paragraph.com*). **LIST PRICE:** $49.

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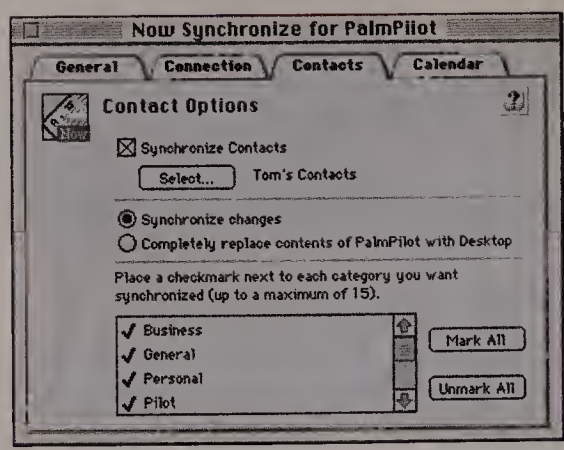
Now Synchronize

DISASTROUS PDA-TO-PIM LINK

THE U.S. ROBOTICS PALM PILOT (see *Reviews*, April 1997) is a terrific PDA, but its calendar and contact software is dramatically inferior to stand-alone personal information managers (PIMs) such as Now Software's stellar Now Contact and Up-to-Date bundle (see *Reviews*, June 1997). As a result, Now Synchronize for Pilot has been eagerly awaited by Piloteers seeking to link the PIM on their desktops to the PDA in their pockets. Alas, Synchronize misses the mark by a mile, delivering poor performance in an inelegant package.

If you've attached contacts, documents, or URLs to an event and then modified the event on the Pilot, you'll get a duplicate in Up-to-Date when you resync. You can't use your Pilot and Synchronize to sync the calendar files on your home and work systems; if you try, you'll corrupt data on one desktop machine or the other. Synchronize requires your Mac to have as much as 12MB of RAM installed, and the release notes state that large contact files (greater than 2000 contacts) may *still* overtax the program.

The release notes helpfully tell you that if synchronization fails, you should select Cancel on the Mac, wait "for as long as 5 to 10 minutes," and try again after restarting with extensions off and allocating even more memory to Synchronize. (If this happens, you may want to consider spending those five or ten minutes figuring out how to send the software back for a refund.)



Sync It Up Now Synchronize lets you pick which desktop contact and calendar categories you want to replicate onto your Pilot.

The program's folder includes files with DOS-style extensions, called audit.dat and users.dat. As if this weren't annoying enough, the release notes warn you not to double-click on audit.dat accidentally, or your Mac will crash. Furthermore, the program won't work if Synchronize and the calendar and contact files aren't on the same hard disk, and Now did nothing to improve on the Pilot's terrible Install application.

Now Synchronize worked most successfully when I used it to replace the Pilot's contents completely with the desktop's data. When I ventured into actual synchronization, small data modifications made on the Pilot synchronized with no problems as long as I was careful to avoid changing events with attached contacts.

Macworld's Buying Advice If your work revolves around your desktop PIM and you use your Pilot only as a portable extension of Now Contact and Up-to-Date, Now Synchronize will probably work adequately for you so long as you keep its limitations firmly in mind. If you use your Pilot constantly for data entry and you have large contact and calendar databases, wait for a more robust version of Now Synchronize, one that's a worthy sibling to Now's excellent PIM pair.—TOM NEGRINO

RATING: ★★/4.3 **PROS:** One-button synchronization of contact and calendar files. **CONS:** RAM hog; doesn't properly sync events with attached contacts; a sloppy Windows port. **COMPANY:** Now Software (503/274-2800, *www.nowsoft.com*). **LIST PRICE:** $39.95.

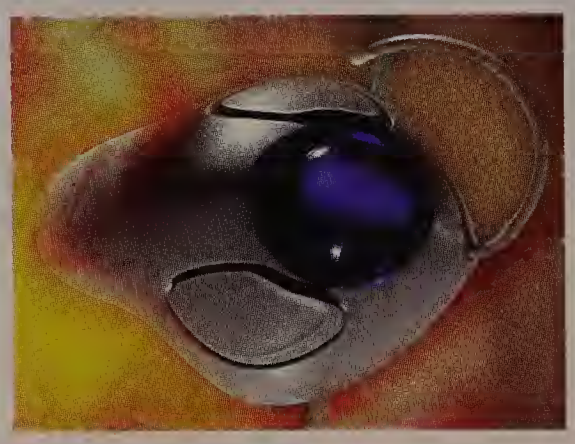
Orbit Trackball

AN ATTRACTIVE MOUSE ALTERNATIVE

THE ORBIT TRACKBALL OFFERS A stylish, less-expensive alternative to Kensington's popular Turbo Mouse (see *Reviews*, February 1997). Instead of employing the typical rectangular shape of most trackballs, the Orbit's contoured case is flared at the top and narrow at the bottom and fits comfortably in the palm of your hand. The Orbit is less bulky than the Turbo Mouse, with a lower profile and a footprint that isn't much larger than most mice.

The Orbit is designed to be operated with your middle three fingers, which Kensington claims is easier than using your thumb. The ball itself is smaller than the one on the Turbo Mouse and, unlike the Turbo Mouse trackball, can't be removed for cleaning. The Orbit's two large, curved buttons are positioned within easy reach of your thumb and pinkie. Both buttons provide an ideal amount of resistance, plus audible and tactile feedback.

The Orbit's symmetrical design makes it suitable for right-handed users and southpaws alike, a boon if you share your Mac. Like its larger sibling, the Orbit ships with version 5.02 of Kensington's MouseWorks utility, which lets you customize cursor response and program the trackball's two buttons. In addition to the button shortcuts provided by earlier releases, the new version sports a feature called Instant Menu that displays a pop-up window containing the current application's menus, making it easier to work with large monitors by limiting trips to the menu bar.


GIBSON

I put the Orbit through its paces running a wide variety of productivity applications and games. Cursor tracking was consistently smooth and predictable, even when my hands were slightly greasy. To test the trackball's durability, I dropped it from desktop height onto carpeted and tiled floors without causing any visible damage. Like Kensington's other products, the Orbit carries a five-year limited warranty.

While reading through Kensington's online product literature, I was surprised to discover a feature not mentioned in the manual. As its name implies, AutoScroll allows you to scroll through windows by rolling the trackball up and down. Unfortunately, this function isn't supported on the Macintosh. (According to Kensington, AutoScroll takes advantage of a feature built into the Windows versions of some Microsoft applications.)

Macworld's Buying Advice The Orbit offers a well-designed solution that should suit most trackball users' needs. If you don't need the two extra buttons that the Turbo Mouse provides—and it doesn't bother you that people who buy the PC version get a feature that you won't—then the Orbit Trackball is a strong contender.—FRANKLIN TESSLER

RATING: ★★★★/7.5 **PROS:** Comfortable palm rest; can be used right- or left-handed; less expensive than most competing products; improved MouseWorks software. **CONS:** AutoScroll feature not implemented on Macs. **COMPANY:** Kensington Microware (415/572-2700, *www.kensington.com*). **COMPANY'S ESTIMATED PRICE:** $69.95.

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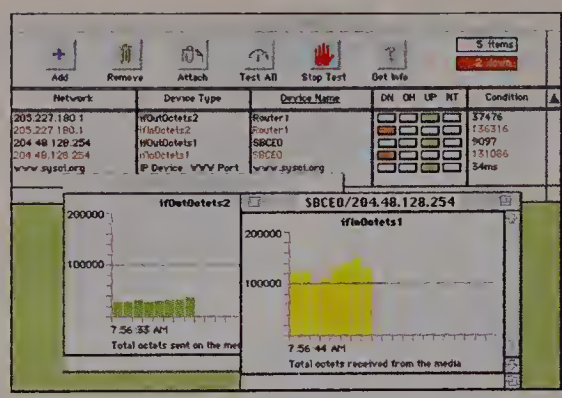
WebWatcher 4.1

WEB-SITE MONITOR DOESN'T LIVE UP TO ITS NAME

WHEN YOU'RE RUNNING A Web server remotely, you want to keep an eye on hit counts and accessibility. Caravelle's WebWatcher 4.1.1 promises to do both of these chores but delivers on only one: monitoring accessibility. (Caravelle says the traffic-counting feature never made it into the Mac version of the product.) Even the accessibility check is limited and generic, simply verifying that your Web server responds to a simulated HTTP request. And while its other monitoring capabilities are innovative and powerful, WebWatcher's design flaws and feature shortfalls make using it a frustrating experience.

Like other SNMP network monitors, WebWatcher—a stripped-down version of the Caravelle product once known as NetWorks (see *Reviews*, April 1995)—scans your network for devices, probes them on a regular basis, and notifies you of a down device or out-of-spec measurement. Its two novel features are route-following probes, which help avoid redundant failure notifications, and escalating notifications, a way to alert additional people of network problems.



Keeping an Eye on Things WebWatcher can monitor both individual performance variables and whether or not your Web, FTP, or other TCP/IP server is responding correctly to requests.

WebWatcher can also graph device performance, but the graphs are fixed in size and, because they can't be scrolled, useless for long-term historical trends; nor can they be printed or saved. Competing products can scroll, print, and save graphs, all essential steps in analyzing the data a network monitor collects.

Another drawback is WebWatcher's complex, nonintuitive user interface. For example, in the dialog box for adding items to be scanned, you press Cancel to save the list. And while the online help is useful, the HTML-based user guide is not: the screen shots are illegible, the organization is illogical, and it covers both WebWatcher and another product without indicating which features belong to which.

WebWatcher is also expensive if you need to monitor more than a few devices. The low-end version, advertised as accommodating ten devices, actually allows only ten *items* in its probe list—even if they're all measuring the same device. I easily maxed out the high-end, 300-device version when attempting to monitor multiple ports on a workgroup of 10 servers.

Macworld's Buying Advice WebWatcher has some nice features, but its poor user interface and documentation, lack of analysis and printing features, and inexplicable omission of promised Web-monitoring features render it virtually useless for Web watching. Server-specific tools, such as those available for StarNine's WebStar, may be a better alternative.—MEL BECKMAN

RATING: ★★/3.5 **PROS:** Route-following probes; escalating notifications; protocol-level test scripts. **CONS:** Complex, nonstandard interface; confusing documentation; missing Web-monitoring features; no print capability; inflexible graphing. **COMPANY:** Caravelle (613/225-1172, *www.caravelle.com*). **LIST PRICE:** $295 for 10 devices; $999 for 300 devices.

System Sculptor 2.0

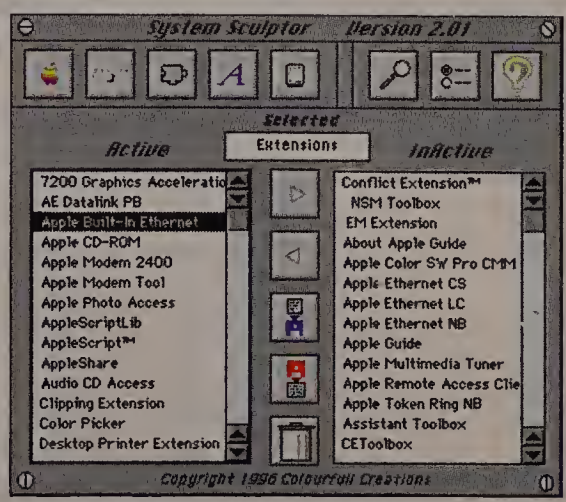
BARE-BONES MANAGEMENT EXTENSION

SYSTEM SCULPTOR'S BIGGEST problem is that it *isn't* Conflict Catcher 4, the definitive start-up manager from Casady & Greene (see *Reviews*, July 1997). This unassuming replacement for Apple's Extensions Manager allows you to selectively turn on and off control panels, extensions, fonts, and Apple menu items—just like Conflict Catcher—but it lacks almost every one of the features that make Conflict Catcher a valuable tool.

The program's minimalist interface consists of a single window with two panes. The left side lists active control panels, extensions, fonts, and Apple menu items; the right side shows deactivated components. Two buttons shuttle files between the lists, but you have to restart your Mac to activate the changes.

The problem is that System Sculptor does little more than allow you to turn files on and off. It offers no conflict-testing features and doesn't allow you to sort or list files according to such criteria as RAM usage or installation date, nor does it let you group files that need to be turned on together. Although the program shows you basic information about each file (the creator and type codes, for example), it doesn't provide other critical information such as the file's version number or vendor's name.

System Sculptor's method for storing custom start-up sets is particularly dismal. Instead of simply saving a particular system configuration as a set (as you can with Extensions Manager or Conflict Catcher), you must export each configuration as a separate file. To switch between sets, you import a stored file. Even worse, you have to create a separate settings file for each *type* of start-up file—one for fonts, another for extensions, and so on. The approach is pathetically clumsy and time-consuming.



Carving a Niche System Sculptor isn't pretty, but it provides the basic tools you need to turn system components on and off.

On a positive note, System Sculptor doesn't dump any additional control panels or extensions into your system, so it doesn't add to the system glut you're trying to control. Also, while Extensions Manager does not allow you to access extensions that Apple deems too esoteric, System Sculptor lets you activate and deactivate every single extension in your system, from the Serial Port Arbitrator to the Clipping Extension.

Macworld's Buying Advice System Sculptor is less expensive than Conflict Catcher, but not by much. Given its interface weaknesses and dearth of features, it makes far more sense to spend a bit more and buy Conflict Catcher, an elegant and powerful program that does what start-up managers really should.—JOSEPH SCHORR

RATING: ★★/3.0 **PROS:** Adds no additional extensions or control panels to your system; provides broader access to contents of Extensions folder than Extensions Manager. **CONS:** No conflict-testing features; minimal information about components; cumbersome set creation. **COMPANY:** Colourfull Creations (810/749-3013, *users.aol.com/cesoftware*). **LIST PRICE:** $29.95.

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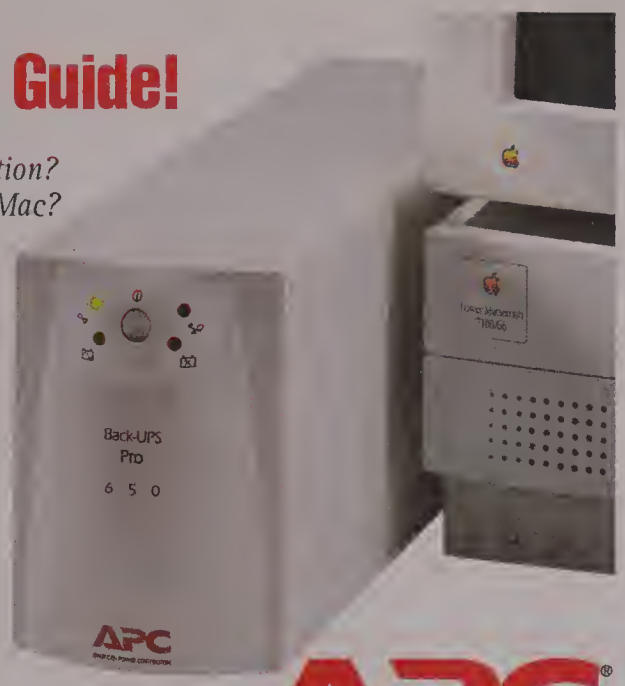

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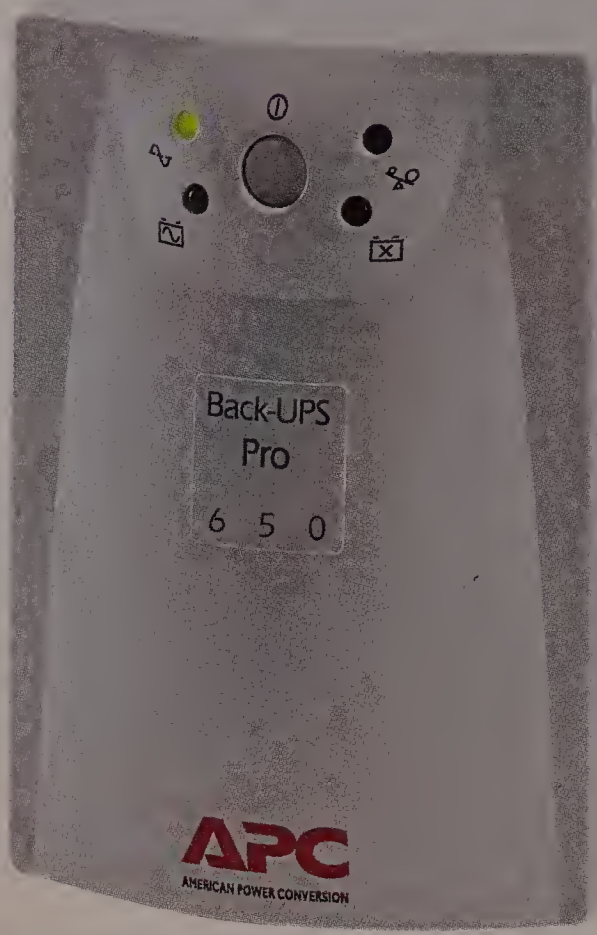

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Antonio Pasin, Radio Flyer

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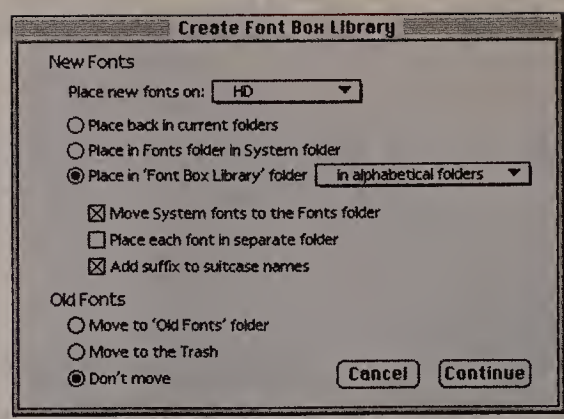
Font Box 2.1

FONT ORGANIZER IS HELPFUL BUT NOT A PANACEA

FORGET THE AUGEAN STABLES—if Hercules were alive today, the gods would no doubt assign him the task of organizing my fonts. But since Hercules isn't around, I gave the job to Insider Software's Font Box 2.1 (Standard Edition). In theory, this font organizer is a godsend; in practice, it has some problems.

Font Box finds all the fonts on your hard drive, flags the damaged ones, repairs them if it can, eliminates duplicates, identifies orphans, and fixes font ID conflicts. Then it creates a new, clean font library organized the way you want it. Other options let you add a suffix to suitcase names to identify TrueType or PostScript fonts, keep or discard identically named fonts from different foundries, remove bitmapped fonts larger than 12 points to save disk space (if you use Adobe Type Manager), and remove either the TrueType or the PostScript version of a font if both are present.

I like Font Box's flexibility. For example, it can list problems and let you choose which ones to fix, or simply fix problems automatically. You can also decide how the program organizes your new font library. I chose to have it place fonts in alphabetical folders; they can go in a single folder or the System Folder's Fonts folder, if you prefer.



Where Would You Like Your Fonts? Font Box lets you decide how to organize your font library.

The first time I ran Font Box, it chugged along for about 20 minutes and then crashed my computer. A troubleshooting section at the back of the manual suggested turning off extensions or allocating more memory. I did both and had no more crashes, though I wish that information had been at the *beginning* of the manual.

I was happy to see a new set of fonts placed in alphabetical subfolders inside the Font Box Library folder—no more bitmapped font suitcases without their PostScript outline counterparts, no more damaged fonts, and no more duplicate fonts wasting valuable disk space. My happiness faded, however, when I opened Microsoft Word and printed some sample text. Several bitmapped fonts had been mistakenly labeled as TrueType and added to my new font collection; being bitmaps, they printed with the jaggies. Others printed with substitute fonts, and one pictorial font displayed incorrectly as letters (though it did print as pictures). These are just the kinds of problems Font Box claims to fix.

Macworld's Buying Advice Although Font Box 2.1 isn't all I'd hoped it would be, it has a better interface and lower price than the last version we tested (see *Reviews*, November 1996). If you want a utility that organizes thousands of scattered, orphaned, and duplicate fonts, and don't mind doing a little last-minute cleanup of your own, $79.95 is a small price to pay. Font Box isn't perfect, but I'll bet even Hercules missed a stall or two.—ERFERT FENTON

RATING: ★★★/6.8 **PROS:** Good at locating and sorting fonts; flexible organization options. **CONS:** Some bitmapped fonts mistakenly added to library. **COMPANY:** Insider Software (619/622-9900, *www.theinside.com*). **LIST PRICE:** $79.95 (other configurations available).

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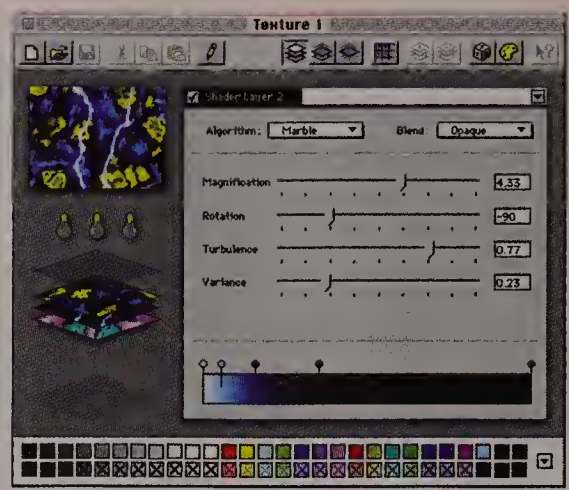
Texture Creator 2.0

REAL WOOD NEVER LOOKED THIS GOOD

TEXTURE CREATOR 2.0 HAS A knack for transforming design novices into imaging gurus. Once known as Adobe TextureMaker 1.0 (see *Reviews*, October 1995), this cross-platform texture generator from Three D Graphics makes it easy to enhance graphics, presentations, and Web sites with realistic 3-D textures. Although it's missing some of its predecessor's features, it offers more preset textures, more-precise editing options, and an improved interface.

Texture Creator lets you choose from 200 editable textures ranging from fluffy clouds to rough granite; if you don't find what you're looking for among the presets, you can easily create your own textures. A texture consists of up to seven layers, each with four adjustable properties—lighting, shading, edging (beveled or rounded), and dimensions. New keyboard commands corresponding to the properties take the guesswork out of duplicating an image.

After you change a property, Texture Creator rerenders the image and displays the results in a preview window. By clicking on a layer, you can make detailed adjustments to hue, roughness, and other attributes using numeric values and sliders. To change the lighting, you adjust the location and angle of three spotlights. Texture Creator's intuitive interface shows what layer you're working on and its relative order (represented by stacked icons); to change the order, just drag and drop the icons.



The Layered Look Texture Creator's intuitive interface makes it easy to tweak your textures.

Aside from improved ease of use, Three D Graphics has added some new features to the mix. In TextureMaker 1.0, you had to adjust the application and memory requirements for every texture; the new version requires a constant 4MB of RAM. The Power Mac–only Texture Creator also saves images in more formats and doubles the number of preset textures. Other welcome additions are online help, a more comprehensive manual with tutorials, and a texture-creation wizard.

Although Three D Graphics made some nice enhancements to the program, it also left out some of TextureMaker's key features: Texture Creator can render only seven layers to TextureMaker's ten, can't create QuickTime movies, and no longer has Adobe Photoshop filters. Version 1.0's texture-animation features were eliminated to speed up the program, but you can download a free version of Texture Animator, an application that creates QuickTime and AVI movies, from Three D's Web site.

Macworld's Buying Advice Texture Creator 2.0 packs a professional-level product into a beginner's package. Although it's missing some of TextureMaker's valued features, it's still a strong all-in-one texture designer.—ALLYSON BATES

RATING: ★★★★/7.0 **PROS:** Smooth, fast rendering; textures are easy to customize; intuitive interface. **CONS:** No animation features or Photoshop filters; only seven layers. **COMPANY:** Three D Graphics (310/553-3313, *www.threedgraphics.com*). **LIST PRICE:** $129.99.

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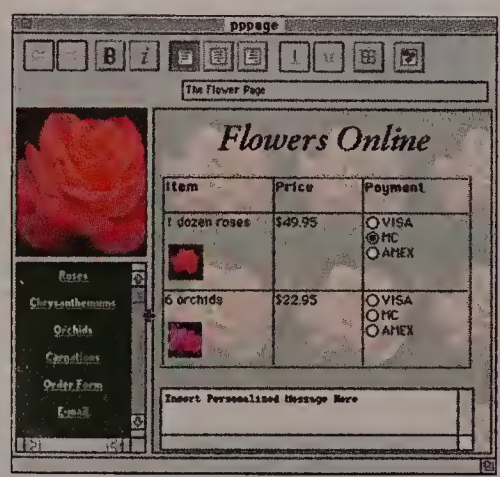

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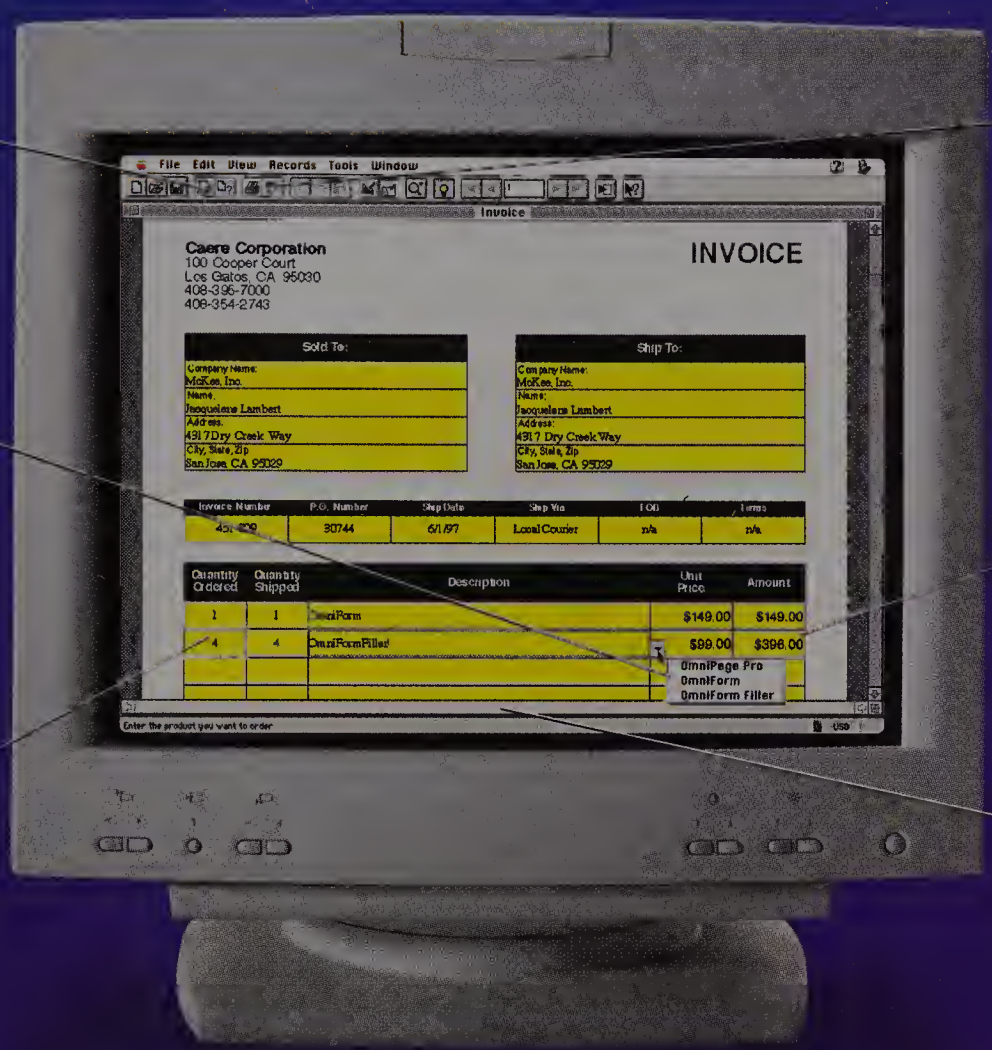

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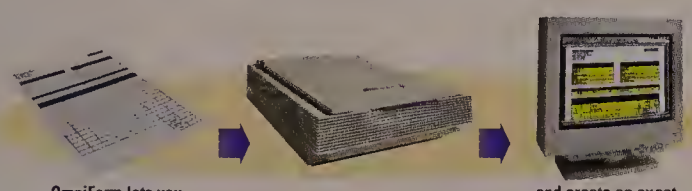

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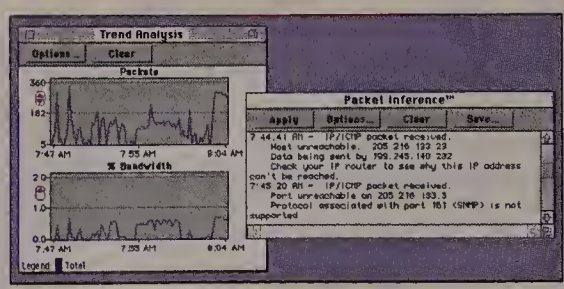
NetMinder 4.0

A FINGER ON YOUR NETWORK'S PULSE

EVERY NETWORK SHOULD HAVE regular health checks, but few network analyzers combine overall monitoring with detailed problem diagnosis. Neon Software has jumped into the breach with NetMinder Ethernet 4.0.2. While not as sophisticated or powerful as AG Group's EtherPeek (see *Reviews*, December 1996), NetMinder has one unique feature that makes it a valuable diagnostic tool: a rule-based problem detector. And at $795, it's still the cheapest network analyzer on the market.

NetMinder consists of the analyzer application and a library of decoders for TCP/IP, DECnet, NetWare, Banyan, AppleTalk, XNS, QNX, IP version 6, and bridge/router protocols. A window displays every captured packet, using color coding to sort out separate traffic streams; it also decodes any selected packet. NetMinder lacks online descriptions of protocols, but a supplied HTML reference page points to online descriptions. The new version also adds automatic name resolution, which translates numeric network addresses into human-friendly names.



Network Health Check NetMinder's Packet Inference display suggests specific problem areas that may require attention.

Like other network analyzers, NetMinder eavesdrops on network traffic by taking over an Ethernet interface in your computer, capturing and categorizing every packet. A set of five filters lets you extract only packets you're interested in, and every protocol includes a decoder for viewing the contents of any packet.

In addition to filtering, you can set a trigger to start (but not stop) packet capture, either at a specific time or traffic level or when a filter condition is met. A trend-analysis graph shows packet counts and bandwidth use for the entire LAN; you can configure it to show traffic levels seen through specific filters as well. Protocol and address histograms sort out traffic volumes, and you can now output the histograms as self-updating HTML documents.

NetMinder's most innovative feature is its Packet Inference engine, which continuously monitors your network for possible problems and displays a scrolling log of warning messages. One test I ran on a large LAN with hundreds of users immediately revealed a performance-robbing routing loop—a problem that would have been difficult to diagnose manually. This feature alone makes NetMinder worth having.

NetMinder isn't the ultimate network analyzer, however; it lacks some features found in competing products, such as error-rate monitoring, pager and e-mail notification, and AppleScript capabilities. The five-filter limit can also be constraining.

Macworld's Buying Advice Despite its limitations, NetMinder's ease of use and ability to diagnose problems quickly make it a worthwhile tool. Even if you already have a full-featured network analyzer, NetMinder is the easiest way to give your network a quick checkup.—MEL BECKMAN

RATING: ★★★★/7.8 **PROS:** Trend-, protocol-, and address-analysis graphs; rule-based problem detector; automatic name resolution; HTML output. **CONS:** No paging or e-mail notification; no error-rate monitoring; limited to five filters. **COMPANY:** Neon Software (510/283-9771, *http://www.neon.com*). **LIST PRICE:** $795.

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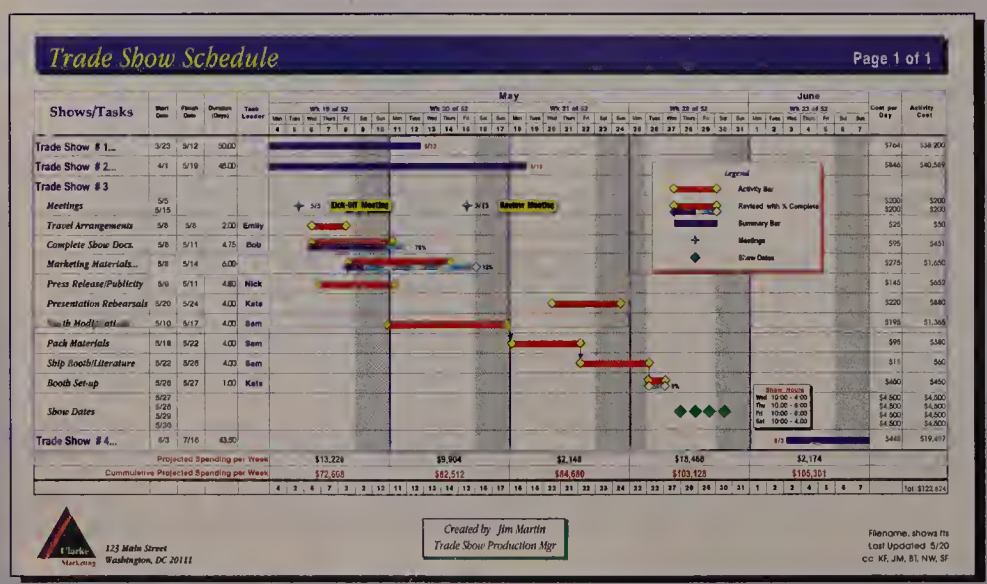

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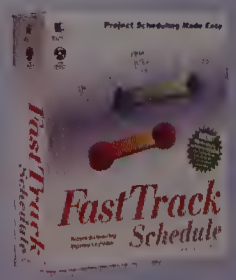

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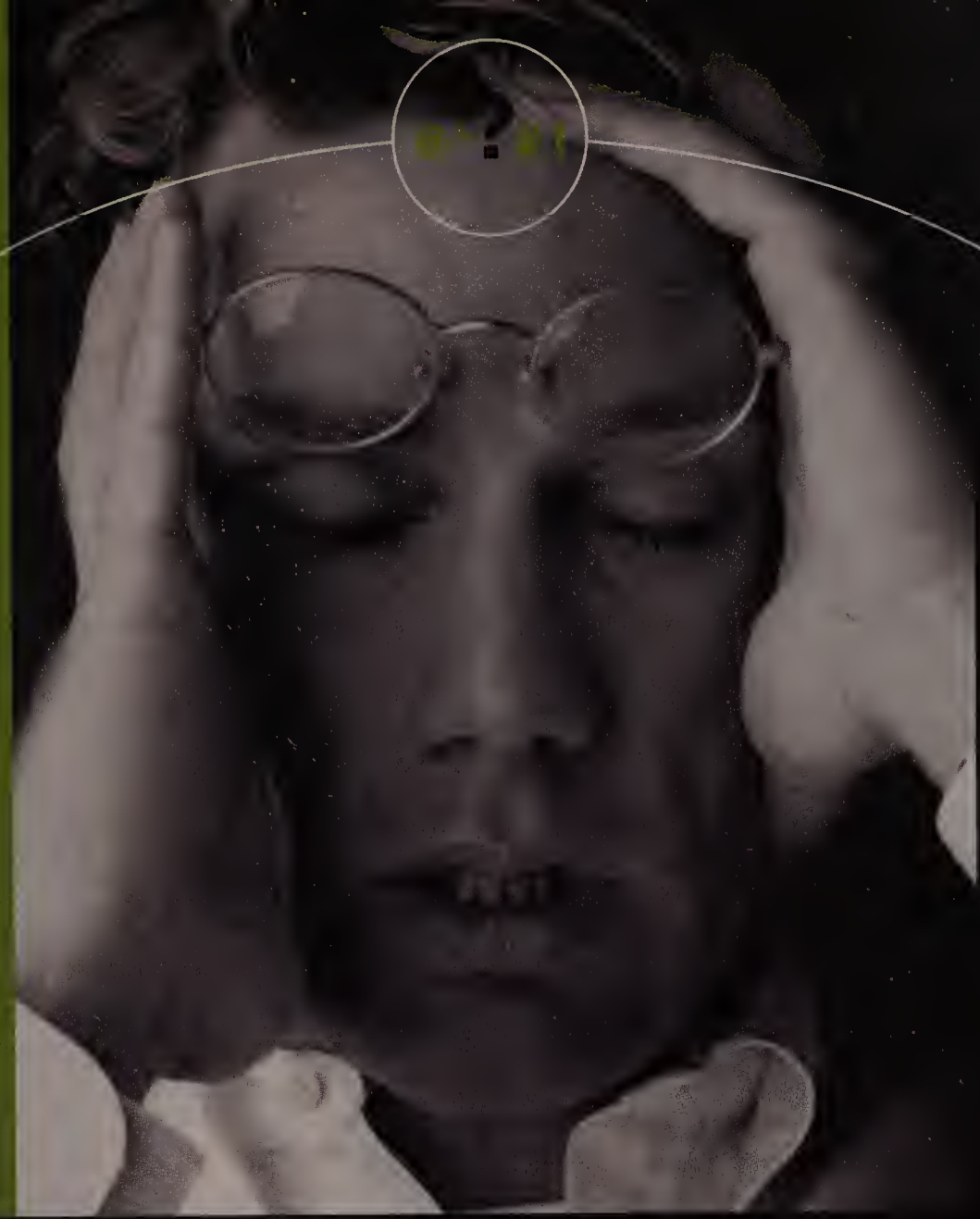

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Damage Incorporated

GAME SHOOTS ITSELF IN THE FOOT

THE LATEST ENTRY IN THE 3-D combat/strategy game genre, MacSoft's Damage Incorporated features a special team of exceptional Marines battling a coalition of high-tech militias—and their own mental problems. Damage Incorporated uses Bungie Software's Marathon engine but adds a twist: instead of roaming levels alone, you command a squad of up to four Marines.

Each soldier's dossier outlines his personality and strengths, and squad members react differently to their foes. But aside from quirky behavioral traits, each soldier's foibles have little effect on game play.

Damage Incorporated's creator admits he has no real military knowledge, and it shows. Squad members react to orders in a disorganized manner, and weapons are very loosely modeled after the real thing. Although many missions are preceded by excellent artwork, the graphics within the game are shoddy. Enemies are mannequin-like, and soldiers seem to move by levitation.

The game's structure is similarly flawed and uneven. Your squad mates can absorb a disproportionate amount of damage, and they never have to reload. Conversely, they can't heal, and their artificial intelligence is not good enough to allow them to avoid injury. A mapping function allows you to differentiate enemy forces from your own, but it also allows you to detect enemies before you actually see them—an unrealistic tactical advantage.

Marine Mayhem Damage Incorporated's grasp on reality is tenuous. You'd have to be one tough Marine to fire two shotguns at once.

The game's tepid heavy-metal soundtrack is punctuated by battle cries and shouts from the squad members, reflecting their various psychoses. These degrading sound bites (such as "I love the sound of a just slaying") reflect the worst misconceptions about the Marine Corps.

Most of Damage Incorporated's myriad flaws would be less annoying if game play lived up to expectations. Damage Incorporated fails to convey any semblance of danger, and you can easily clear the first few levels by ordering your squad to search and destroy while you lazily search for the access card for the single locked door.

There is a bright side: Damage Incorporated's story line is extremely well constructed, and its network play is masterful. Up to four people can join a game, and each can command four squad members. If you're primarily a network player, this intense network play might compensate for the game's other weaknesses.

Macworld's Buying Advice Compared with other games based on the Marathon engine—including MacSoft's own Prime Target—Damage Incorporated is mediocre. It's a valiant attempt to advance the first-person shooter genre by incorporating a strategic element, but poor design and uneven implementation sabotage it.—DANIEL MADAR

RATING: ★★/4.4 **PROS:** Innovative squad structure; strong multiplayer action. **CONS:** Poorly designed; unbalanced play. **COMPANY:** MacSoft (612/509-7600, *www.wizworks.com/macsoft*). **COMPANY'S ESTIMATED PRICE:** $34.99.

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Back-to-School Guide

ActivChemistry

CHEMISTRY WITHOUT TEARS

Most of us would rather explain the income tax code than decipher the chemical compounds on a shampoo label. Luckily, there's ActivChemistry (★★★★/**7.0**; $19.95 list price), a collaboration of Salamander Interactive and Addison-Wesley (415/854-0300, *www.awl.com/bc/*). Taking a multimedia approach to first-year chemistry, ActivChemistry turns you loose in an interactive lab, complete with unbreakable glassware and harmless Bunsen burners. There's just enough sound and motion to lend realism to your experiments without indulging in flashy effects. And ActivChemistry doesn't ignore the importance of solving numerical problems—something that tends to derail students early in the course. It does require instructors to generate course-specific directions, but it's still a bargain compared with the price of a college textbook.—C.S.

ActivChemistry

American Heritage Talking Dictionary

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Pronunciations can be *subtle*, what with unspoken letters, words that *ought* to sound alike but often *enough* don't, and the *potpourri* of words that come to us from other tongues. What's a young one or nonnative English speaker to do? If you don't know your schwa from your umlaut, the American Heritage Talking Dictionary (★★★/**6.9**; $39.95 list price) from SoftKey (617/494-1200, *www.softkey.com*) can sound it out for you. Nearly 200,000 words are defined; recorded linguists pronounce 72,000. An Alternate Spellings feature helps you find words you're unsure how to spell; you can also search using wild cards and by partial definition; and parents and teachers can block preselected words. The 1.5-million-word thesaurus seems incomplete (no listings for *boat* or *auto?*), and the soupçon of videos are a curious selection, but it's far simpler to listen to linguists' pronunciations than to decipher those crazy sim′ bəlz.—P.M.K.

Body Voyage

A 3-D TOUR OF THE HUMAN BODY

For a surgeon's-eye view of the human body without the expense of medical school, check out Body Voyage (★★★★/**7.1**; $39.95 list price) from Time Warner Electronic Publishing (310/581-5818, *www.pathfinder.com/twep/*). This CD-ROM offers a chillingly realistic look at the human anatomy. Four navigation tools let you rotate a cadaver and peel away a layer at a time, view the body in cross section, see 3-D movies that show dissolving muscle and bone, and take an animated trip through the skeleton. Body Voyage is easy to use, and the text and narrations explain what you're looking at and how it was created. The interface is a bit stylized for my taste, but its dark motif complements the subject matter nicely.—F.T.

Britannica CD 97

CLASSIC REFERENCE WORK ON CD-ROM

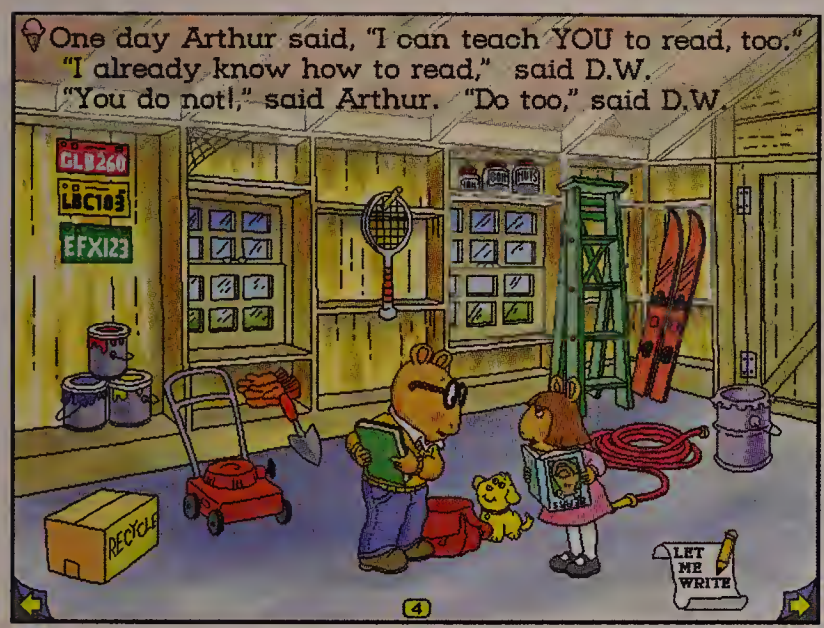
It's been said that Encyclopedia Britannica condenses all of human knowledge into 32 volumes. Amazingly, Britannica CD 97 (★★★★/**7.7**; $150 list price) from Encyclopedia Britannica (800/747-8503, *www.eb.com*) squeezes the whole works—supplemented with 2000 additional articles—onto a single CD-ROM. With Netscape Navigator included as a front end, reading the Britannica CD is much like surfing the Web. Britannica CD's two search modes, Boolean and natural language, are fast and clear advances over the print edition, but they could be improved. The countless links to related articles and index entries are definitely a plus. Britannica CD also contains Merriam-Webster's Collegiate Dictionary and a direct Internet link to Britannica Online (for $50 per year), with its latest updates and a substantial list of related Web sites. No flashy movies or sound files (yet); just the world's best encyclopedia at an incredibly low price.—R.C.E.

Math Advantage

GOOD THINGS COME IN LARGE PACKAGES

Math Advantage (★★★★/**7.5**; $39.99 list price) goes beyond the simple textbook-on-a-disc style of most study-review CDs. This self-paced set from Aces Research (510/683-8855, *www.acesxprt.com*)

includes a workbook and five math-topic CDs: algebra, geometry, trigonometry, statistics, and beginning calculus. A built-in quiz rearranger helps students avoid the tedium of identical, textbook-based test pages click after click. If you perform well enough on the quizzes, you're rewarded with an online puzzle before heading back to work. The CD's well-explained material goes far beyond the basic "SAT warm-up" algebra and geometry topics covered in most other high-school math programs, giving stronger students a head start on important college courses. Math Advantage can boost math confidence *and* SAT math scores.—C.S.



Arthur's Reading Race

Arthur's Reading Race

WE ALL READ FOR ICE CREAM

Although their parents worry about sibling rivalry, children often find it amusing. Arthur and his precocious sister, D.W., compete for the limelight in Arthur's Reading Race (★★★/6.9; $30 street price), a new addition to Brøderbund Software's (415/382-4400, *www.broderbund.com*) popular Living Books series. Children work their way through different scenes on Arthur and D.W.'s trip to the ice cream store, playing games that help them match words with their corresponding pictures (they can also watch and listen as the scenes unfold automatically). My five-year-old's reading skills showed no measurable improvement—he worked his way through most scenes by trial and error, pointing and clicking without using any spelling or reading skills. Even so, he and his two-year-old sister were endlessly amused by the animations. I suppose it's a testament to Arthur's entertainment value that they spent hours jostling for the control of the mouse like good sibling rivals.—A.M.

Easy Grade Pro 3.0

MAKING THE GRADE, EASIER

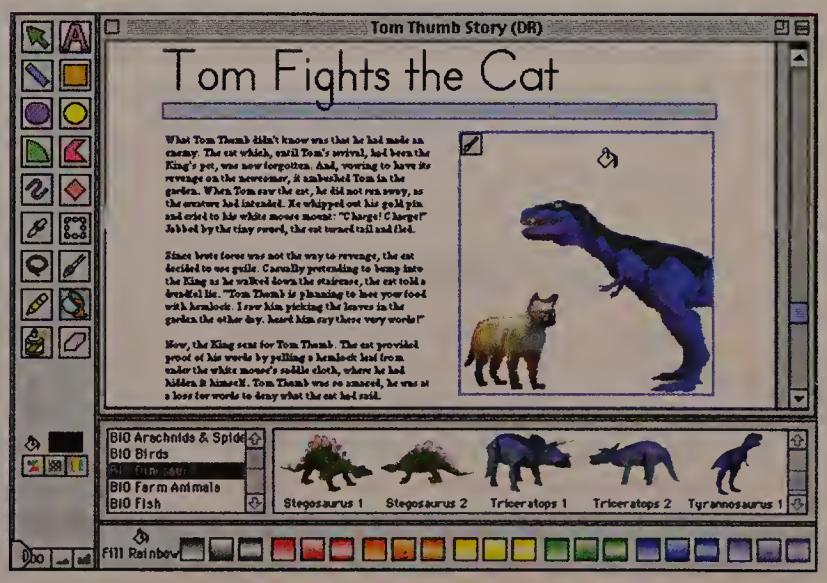
Many programs help teachers with the tedious and demanding tasks of recording, compiling, analyzing, charting, and reporting grades and attendance. Easy Grade Pro (★★★★/8.9; $49 list price) from Orbis Software (206/848-6899) is a relative newcomer, but its intelligent design has catapulted this Mac-only program to the head of the class. A busy teacher can keep all classes for a year in a single grade-book file, saving hours of opening and closing when compiling information on individual students. What's more, Easy Grade Pro is generally more forgiving of human errors than other grade programs. If you miss a single score while entering a column of figures, you can easily insert the missing score without retyping the others. More important, the program allows you to undo almost anything. Easy Grade Pro is sure to become the pet program of every Mac-savvy teacher.—S. and G.B.

ClarisWorks for Kids

YOU'LL WISH YOU WERE YOUNG AGAIN

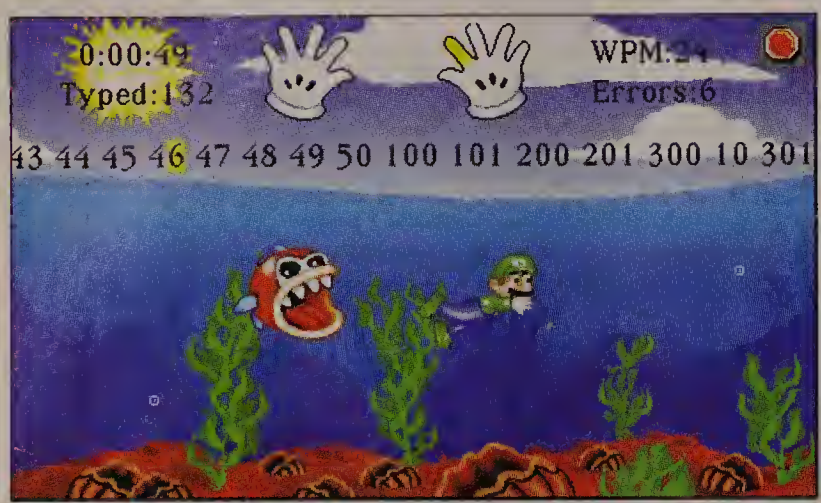
ClarisWorks may soon become a lifetime companion when ClarisWorks for Kids (not rated; $49 expected list price) from Claris (408/987-7000, *www.claris.com*) is released later this summer. I got a peek at a beta version, and it should become as popular among the elementary set as its older sibling is with teenagers and adults. A simplified interface gives kids Art Pads for painting and drawing, Writing Pads for word processing, Graphing Pads for spreadsheets, and List Pads for databases. All controls give audible feedback, and the program can speak each menu choice and dialog box, so prereading kids aren't left out. Activities tem-

continues



ClarisWorks for Kids

plates take you through fun tasks such as creating a school newsletter, building people out of body parts, and graphing baseball scores. After dragging clip art of astronauts onto a moon-base scene (and adding some dinosaurs and a pepperoni pizza for effect) my eight-year-old son delivered his verdict: "This is totally neato!" Dad thinks so, too.—T.N. and S.S.



Mario Teaches Typing 2

Mario Teaches Typing 2

LACKLUSTER GAMES AREN'T THE WORST OF IT

Mario Teaches Typing 2 (★★/4.1; $29.95 street price) strives to offer "a fun and innovative approach to learning essential typing skills" for ages 6 to 101, but Brainstorm's (714/553-9557, *www.brainstormfun.com*) arcade-style animations clog the life out of this tutorial. Few teenagers or adults will enjoy Mario's goofy "games" (you can't lose if you make too many errors—Mario, Luigi, and the Princess just stand still until you hit the next correct key), and the CD doesn't provide enough background information for younger typists. It took me several false starts before I realized what was required in the Evaluation Test, and Mario teaches *typewriter*-style typing—with two spaces after a period—as opposed to computer keyboarding, where you properly use a single space after closing punctuation. Even its graphics aren't an improvement on the old Donkey Kong arcade games. If you want to learn typing, take a semester course at school or check out Mindscape's (415/897-9900, *www.mavisbeacon.com*) superior product, Mavis Beacon Teaches Typing.—S.C.

Preschool Mother Goose

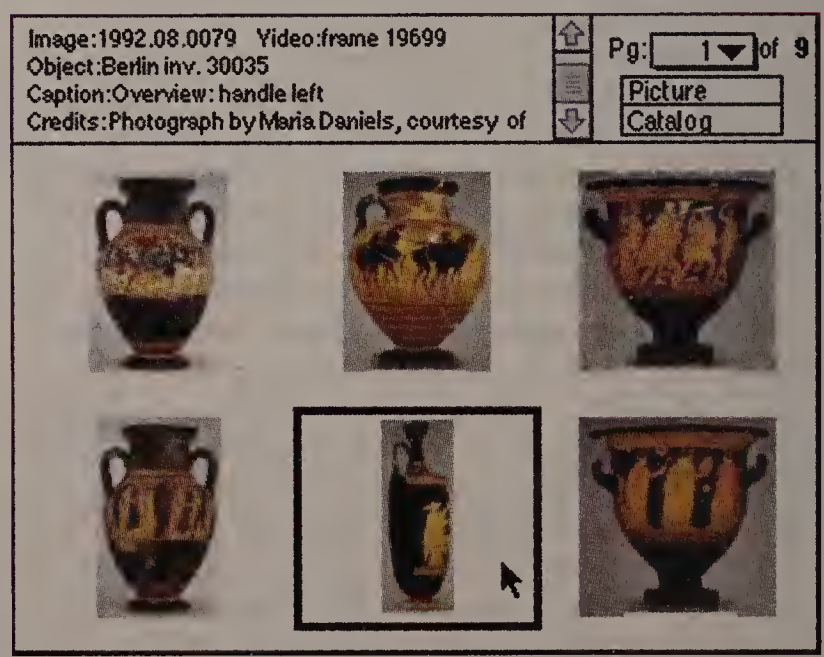
NURSERY RHYMES TUTOR THE WEE ONES

Counting the animals for the Farmer in the Dell, reading along with Little Miss Muffet, and helping an orchestra play "Twinkle, Twinkle, Little Star"; those are some of our favorite things to do with Preschool Mother Goose (★★★/6.7; $39.95 list price) from Piranha Interactive Publishing (602/491-0500, *www.piranhainteractive.com*). Elyse especially likes the music; she knows the words to all the songs. Michael prefers the Find Me activity because he gets to play detective and hunt for the hidden items in the farmyard. At the ripe old age of almost six we're getting a little old for nursery rhymes, so we lent the CD to our neighbor Joshua for an expert preschooler's opinion. He loved it—especially the counting and color games—and his mom didn't have to help him once the CD was set up. We told him he had to give it back soon, though, because the two-year-old twins, Colin and Emily, like watching us use it, especially when it plays the "Barney" song (even though Mom calls it "This Old Man").—E. and M.S.

Perseus 2.0

VIRTUAL TOUR OF ANCIENT GREECE

If all roads lead to Rome, then all digital highways lead to ancient Greece—or more precisely, to Perseus 2.0 (★★★★/7.2; $350 list price) from Yale University Press (800/987-7323, *www.yale.edu/yup/*). Archaeologically, Perseus encompasses vases, coins, sculpture, architecture, and excavation sites, all fully explained and exhaustively indexed. Literarily, Perseus packs two-thirds of all surviving Greek literature—with English translations, happily—onto its four CD-ROMs, along with a Greek–English dictionary and lexicon, a historical overview, an interactive atlas, an encyclopedia, a bibliography, biographies, essays, and more. You may be overwhelmed by the mind-expanding wealth of tools and links, confused by the old-fashioned HyperCard interface, and annoyed by the minor bugs, but if you have an interest in ancient Greece—and a little perseverance—you'll find Perseus endlessly fascinating. (And if you're willing to forgo the majority of the photos, you can pick up the concise edition for only $150.)—R.C.E.



Perseus 2.0

Interactive Geography

A WHOLE-EARTH CD

You can't avoid learning when you use Interactive Geography (★★★★/7.5; $45 list price) from Pierian Spring Software's (503/222-2044, *www.pierian.com*) Odyssey of Discovery series: each task's screen requires that you learn the material presented—such as identifying the prime meridian or finding a certain continental plate—before moving on. The 20-plus learning segments include an overview of the topic, visual and audio instruction, a skills test, and an interactive activity. Though Interactive Geography is simple to navigate, visually pleasing, and comprehensive—including enough material for a whole semester of learning—it is best used in conjunction with other Pierian Spring titles. Continent Explorer II, for example, adds a powerful teacher database to track students' scores on skill segments, and a virtual movie theater to catalog and play QuickTime movies.—A.D.

The Adventures of Tom Sawyer

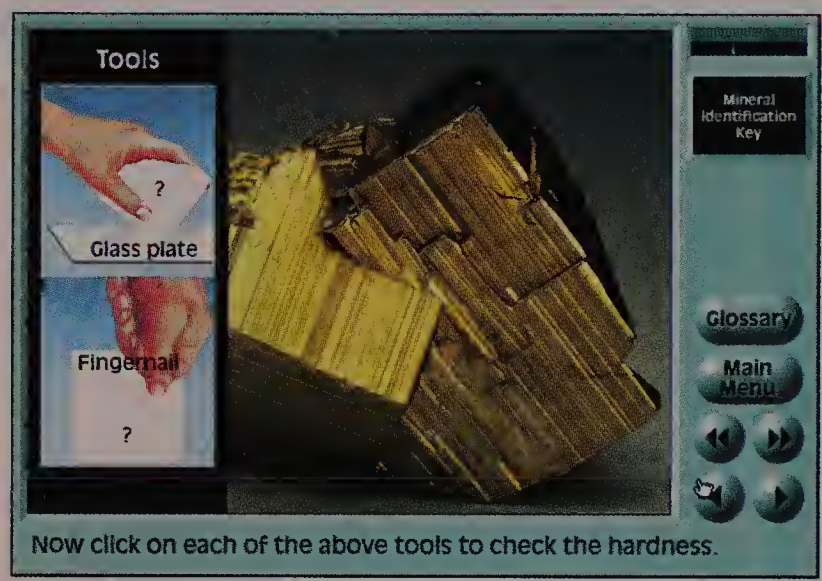
MARK TWAIN GOES DIGITAL IN STYLE

The Adventures of Tom Sawyer (★★★★/7.1; $34.95 list price) from Southern Star Interactive (212/473-1175, *www.sostar1.com*) puts Mark Twain's seminal novel of mid-nineteenth-century America on CD with original illustrations. Additionally, the text is annotated with a seven-minute narrated documentary demonstrating the arc of the Mississippi River's influence on American society, a timeline of Samuel Clemens's life, and an easy-to-access timeline showing concurrent events. Video clips of literary critic Richard Bucci give context to the book and its characters, and links to Southern Star's Web page are easy to follow. Scholars can create a slide presentation for show-and-tell, and a savvy guide for writing critical essays is general enough to be an aid for all studies, not just this book. The product's clunky, PC-centric setup routine is annoying, and its glossary explains only some of the vernacular, but overall this product is excellent.—H.B.

Ultimate Writing and Creativity Center

AVOID THE AGONY OF WRITER'S BLOCK

Ultimate Writing and Creativity Center (★★★/5.6; $34.95 list price), from The Learning Company (617/494-1200, *www.learningco.com*) offers an easy way for six- to ten-year-olds to come up with good writing ideas. Kid-friendly animations draw you into four Idea Lands full of good suggestions for those times when your mind goes blank. You might be able to improve your writing after hearing it read aloud by the text-to-speech feature, but the goofy voice makes everything you write sound like a joke. After you finish writing, a simple page-layout tool helps you add pictures, animations, sounds, and music to your documents. If your child is used to Brøderbund's Kid Pix, the drawing tools will seem weak, and you may be frustrated that you can't resize the program's huge graphics. This product also assumes that kids use only one program at a time: it doesn't support the Mac OS's Application menu for program switching. Even with its glitches, though, it helps get those creative juices flowing.—N.P.



The Wonders of Rocks and Minerals

The Wonders of Rocks and Minerals

ROCK-SOLID EARTH SCIENCE LESSONS

Your kids will have rocks in their heads after spending time with The Wonders of Rocks and Minerals (★★★/6.9; $59 list price) from Tasa Graphic Arts (505/293-2727, *www.swep.com/~tasa/*). This CD supplements classroom studies of minerals; the rock-formation cycle; and igneous, sedimentary, and metamorphic rocks. Each section ends with review questions in which buzzers and bells let students know when they give wrong or right answers, and the Rock Review Challenge motivates students to test their skills in the field. The CD provides rock-identification exercises (useful for teachers), a glossary of terms, and a database of more than 50 minerals. Virtual hands-on lessons—animations, rotatable 3-D models of atoms and crystals, and an interactive lab—make it fun to review the various concepts. You learn to determine a rock's luster, hardness, and specific gravity—all the clues good rock hounds need to start identifying mystery rocks in their own backyard.—K.U. m

Macworld's back-to-school–guide contributors are: Howard Baldwin, Susan and George Beekman, Suzanne Courteau, Andrea Dudrow, Robert C. Eckhardt, Paul-Michael King, Adrian Mello, Tom Negrino and Sean Smith, Nate Piller, Charles Seiter, Elyse and Michael Sutherland, Franklin Tessler, and Katherine Ulrich.

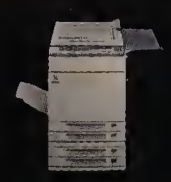
1996 It's the 10th revision and it's a rush.

It's got to be perfect, but color output costs too much.

What you say about color printing can't be printed here.

1997 Introducing the Xerox DocuColor 5750. It adds new words to your vocabulary.

Now you can get color on-budget and on-time. Because the Xerox DocuColor 5750 Digital Color Copier/Printer offers high-quality continuous-tone color at an affordable price. In fact, you can get a connected unit for the cost of a stand-alone color copier/printer. At 6 ppm, it prints Pantone-licensed color and sharper black text. And no one offers more certified front ends (EFI Fiery, DocuPress, Splash). What's more, the DocuColor 5750 is only the newest in the Xerox family. The Xerox Regal 5790 is a proven workhorse. And the DocuColor 40 delivers consistent quality color at a breathtaking 40 ppm. All come with our Total Satisfaction Guarantee. Visit our Web site at www.xerox.com. Or give us a call at 1-800-ASK-XEROX, ext. 670.



DocuColor 5750

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Circle 100 on reader service card

Star Ratings

HARDWARE AND SOFTWARE PRODUCTS AT A GLANCE

Macworld's Star Ratings let you compare Macintosh products based on the authoritative assessments in our reviews and features.

What the Scores Mean The number of stars indicates the product's level of quality; each product also gets a numeric score that provides a more exact assessment of the product's quality within that level. The chart below shows the meaning for each level.

We evaluate seven factors to derive the Star Rating: feature set, design implementation, performance, reliability, ease of use, innovation, and value. We take these evaluations, weight their importance for each class of product, and calculate the final score. The higher the score, the better a product is, even among products with the same number of stars.

Editors' Choice This section also lists products that have been awarded an Editors' Choice designation in a *Macworld* product comparison. That designation indicates a best-of-class product for a particular need.

Ratings Online The ratings listed here are of recently reviewed products in select categories. For a complete, searchable list, go to Macworld Online, at *http://www.macworld.com/pages/star/ratings.html*.

Full Reviews To read a full review of any product in the listing, please consult the issue indicated at the end of the listing or search for the product via Macworld Online (keyword *Macworld* on America Online; URL *http://www.macworld.com* on the World Wide Web). If a product has been upgraded since our last assessment, the most recent version number appears in parentheses after the main reviewed version number.

Vendors: Please write to Macworld Star Ratings, 501 Second St., San Francisco, CA 94107, to inform us of changes in the version number or list price of your product, or of changes to your phone number.

Software

BUSINESS

★★★★/8.9 **Analytica,** Decisioneering, 303/534-1515, $795. Financial-modeling tool helps you assess business decisions. *Mar 97, p. 72*

★★/4.2 **Ascend 4.0,** Franklin Quest, 801/975-1176, $99.95. Information manager isn't competitive with other PIMs. *Apr 97, p. 72*

★★★/5.4 **Day-Timer Organizer 2.1,** Day-Timer Technologies, 415/572-6260, $79.95. All-in-one PIM improved, but not perfect. *Mar 97, p. 72*

★★/3.8 **ePaper 1.5,** Second Glance Software, 360/692-3694, $169. Offers some markup tools, but if you're serious about OCR, invest in a dedicated package. *Jun 97, p. 64*

★★★★/7.1 **Kiplinger TaxCut '96,** Block Financial, 617/428-1119, $29 to $39. Tax software offers friendly interview process. *Mar 97, p. 56*

★★★★/7.7 **MacInTax Deluxe '96,** Intuit, 520/295-3110, $44.95. CD-ROM includes comprehensive state tax modules. *Mar 97, p. 56*

★★★/6.9 **Mariner Write 1.3,** Mariner Software, 502/222-6695, $69.95. Word processor stresses speed and elegance. *Mar 97, p. 63*

★★★★/8.5 **MYOB Accounting 7,** BestWare, 201/586-2200, $89.95 to $139.95. Entry-level accounting package combines ease of use and power. *May 97, p. 69*

★★★★/8.6 **Now Contact and Up-to-Date 3.6.5,** Now Software, 503/274-2800, $99.95. Personal info-management duo gets connected to the Net. *Jun 97, p. 70*

★★★★/8.9 **Personal RecordKeeper 4.0,** Nolo Press, 510/549-1976, $49.95. Database helps you keep tabs on personal information. *Mar 97, p. 83*

★★★★/7.6 **PowerBuilder 5.0,** PowerSoft, 508/287-1500, $2995. Key cross-platform database tool puts Mac's SQL skills on par with Unix and NT. *Apr 97, p. 70*

★★★★/7.4 **Scripter 2.0,** Main Event Software, 202/298-9595, $199. Easy way to make CGIs work on a Mac-based Web site. *Apr 97, p. 74*

★★★★/7.8 **Spreadsheet 2000 2.01,** Casady & Greene, 408/484-9228, $110. This LKISS successor is ready for business. *Jul 97, p. 68*

★★★/5.0 **ViewOffice PowerSuite,** NewSoft, 510/445-8600, $79. Inexpensive scanning with solid image-editing tools but unimpressive OCR features. *Jun 97, p. 64*

GRAPHICS

★★/4.8 **3D WalkAround 1.0,** Abracadata, 541/342-3030, $99.99. Unsuitable for architectural projects, but fine for simple interior space planning. *Jun 97, p. 81*

★★★★/7.0 **ColorWeb 1.0,** Pantone, 201/935-5500, $29.95. Simple, inexpensive color picker and swatch book move to the Web. *May 97, p. 84*

★★★/6.3 **DesignWorkshop 1.5,** Artifice, 541/345-7421, $595. Low-end modeler offers excellent modeling tools. *Apr 97, p. 74*

★★★★/8.6 **Expression 1.0,** Fractal Design, 408/688-5300, $449. Object-oriented natural-media drawing arrives—at last. *Mar 97, p. 50*

★★★★/8.1 **Extreme 3D 2.0,** Macromedia, 415/252-2000, $399. Great 3-D design program for print, animation, Web, and multimedia. *Apr 97, p. 70*

★★★★/8.3 **Full Pixel Search 2.0,** Avian Systems, 201/568-9494, $295. Image-analysis program finds a pixel in a haystack. *Mar 97, p. 84*

★★★★/8.1 **Poser 2.0,** Fractal Design, 408/430-4100, $249. Human models in 3-D (clothing optional). *Mar 97, p. 76*

★★★★/8.9 **ScanPrepPro 3.1,** ImageXpress, 770/564-9924, $695. Photoshop plug-in puts image processing on autopilot. *Mar 97, p. 80*

★★★★/7.5 **WalkThrough Pro 2.6,** Virtus, 919/467-9700, $495. Best choice to quickly and elegantly create an architectural walk-through. *Jun 97, p. 81*

INTERNET/NETWORKING

★★★/6.6 **ActionLine 1.1,** Interactive Media, 415/948-0745, $99. Beginners can add pizzazz to Web pages without Java programming. *Apr 97, p. 76*

★★★★/7.0 **Bolero,** EveryWare Development, 905/819-1173, $995 to $4995. Best tool for gathering demographics from your Web site; expensive. *Apr 97, p. 68*

★★★★/8.2 **Claris Emailer 2.0,** Claris, 408/727-8227, $49. E-mail innovator gets a face-lift and speed boost. *Jul 97, p. 52*

★★★★/7.0 **Claris Home Page 2.0,** Claris, 408/727-8227, $99. Web authoring tool is great for building small to medium-size sites. *May 97, p. 56*

★★★/5.1 **CometPage 1.0.5,** Digital Comet, 415/331-5551, $149. Makes it easier to create dynamic Web pages—as long as you're comfortable working with HTML. *Jul 97, p. 70*

★★★★/8.1 **CommuniGate 2.8,** Stalker Software, 415/383-7164, free (5 users) up to $600 (200 users). Fast, reliable multimedia messaging suite adds new features. *Jun 97, p. 86*

★★★★/8.1 **CyberStudio 1.0,** GoLive Systems, 415/463-1580, $349. Web-site builder offers precision page layout at a great price. *Jul 97, p. 56*

★★★★/7.3 **Dave 1.0,** Thursby Software Systems, 817/478-5070, $179. Painless Mac file sharing on Windows networks. *May 97, p. 72*

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REAL PRODUCTS REAL RATINGS Reviews you can trust: Unlike other publications, Macworld rates only final shipping products, not prototypes. What we review is what you can actually buy. Outstanding ★★★★★ = 9.0–10.0 Very Good ★★★★ = 7.0–8.9 Good ★★★ = 5.0–6.9 Flawed ★★ = 3.0–4.9 Unacceptable ★ = 0–2.9

Star Ratings

★★★/5.3 **FileMaker Pro CGI,** Claris, 408/987-7000, free. Slow and inflexible FileMaker Pro Web publishing tool. *Apr 97, p. 114*

★★/4.8 **FrontPage 1.0,** Microsoft, 206/882-8080, $149. Behemoth is long on Web-site management, short on authoring tools. *Jul 97, p. 68*

★★/4.1 **Globetrotter 1.1,** Akimbo Systems, 617/776-5500, $99. Web tool avoids HTML but has stability problems. *Apr 97, p. 66*

★★/4.9 **Insta.html 1.0,** Trailer Parc Technologies, 415/248-1350, $179. Overpriced plug-in has difficulty with FreeHand-to-Web conversion. *May 97, p. 82*

★★★★/7.5 **Internet Gateway 3.7.3,** Vicom Technology, 415/691-9520, $249 to $750. Network router software offers speedy Internet connections. *Jul 97, p. 70*

★★★★/7.2 **Lasso 1.1,** Blue World Communications, 206/313-1051, $299. Lasso successfully ties FileMaker Pro databases to the Web. *Apr 97, p. 114.* **Editors' Choice** for best Web database.

★★★/6.5 **Lasso Lite 1.0.6,** Blue World Communications, 206/313-1051, free. FileMaker Pro Web publishing tool is fast and free. *Apr 97, p. 114*

★★★★/7.1 **NetObjects Fusion 1.0,** NetObjects, 415/482-3200, $695. Delivers precise positioning of Web page elements; no spelling checker. *May 97, p. 60*

★★★/6.9 **Phantom 2.0,** Maxum Development, 630/830-1113, $395. Web crawler lets you build your own search pages. *Jul 97, p. 78*

★★★/6.5 **ROFM 4.1,** Russell Owen, *rowen.astro.washington.edu*, free. Web publishing freeware with more features, but needs modification. *Apr 97, p. 114*

★★★★/7.5 **RunShare 2.1,** RUN, 201/529-4600, $399 (2 users) up to $2499 (25 users). AppleTalk network tool revs up file transfers by 250 to 400 percent. *Jun 97, p. 86*

★★★★/7.3 **Tango for FileMaker Pro 2.1.1,** EveryWare Development, 905/819-1173, $349. No faster way to Web-enable a FileMaker Pro database. *Apr 97, p. 114.* **Editors' Choice** for best Web database.

★★★★/7.2 **Visual Cafe 1.0,** Symantec, 541/334-6054, $199.95. Faster, easier Java coding, great for creating applets from scratch. *May 97, p. 67*

★★★★/7.2 **Visual Page 1.0,** Symantec, 541/334-6054, $99.95. Web authoring tool has polished features and is easy to use. *May 97, p. 56*

★★★★/7.0 **Web-FM 3.0,** Web Broadcasting, 415/329-9676, $245. FileMaker Pro Web integration tool is strong and fast but hard to learn. *Apr 97, p. 114*

★★★★/7.7 **WebStar 2.0,** StarNine Technologies, 510/649-4949, $795. Web server is better, stronger, faster. *Apr 97, p. 62*

MEDIA

★★★/6.2 **Acrobat 3.0,** Adobe Systems, 408/536-6000, $295 to $1595. New features still limit use of this portable document program. *Apr 97, p. 52*

★★★★/7.1 **Adobe Persuasion 4.0,** Adobe Systems, 408/536-6000, $395. Presentation application makes the leap to the Web. *Mar 97, p. 52*

★★★★/8.5 **Aurorix 2.0,** DigiEffects, 415/841-9901, $289. From aged film to earthquakes, Aurorix's 26 usable effects are creatively designed. *May 97, p. 118.* **Editors' Choice** for best After Effects plug-ins.

★★★★/8.1 **Berserk 1.3,** DigiEffects, 415/841-9901, $289. This After Effects plug-in has great fog, blizzard, laser, and star-field effects. *May 97, p. 118.* **Editors' Choice** for best After Effects plug-ins.

★★★★/7.7 **Boris Effects 2.1 MP,** Artel Software, 617/451-9900, $350 to $695. Best Adobe Premiere and Media 100 plug-in; adds motion graphics, keying, and transition effects. *May 97, p. 118.* **Editors' Choice** for best Premiere and Media 100 plug-ins.

★★/3.7 **CD Speedster,** Syncronys Softcorp, 213/340-4100, $29.95. Provides modest CD acceleration, but only in limited cases. *Jul 97, p. 58*

★★★★/7.5 **Cyclonist 1.0,** DigiEffects, 415/841-9901, $495. This particle-generation specialist is a complex After Effects plug-in. *May 97, p. 118*

★/1.5 **d-Time,** Acceleration Software, 206/224-3727, $59.95. This CD-ROM accelerator is disappointing across the board. *Jul 97, p. 58*

★★★/6.4 **Dynamic Effects 1.0,** Gryphon Software, 619/536-8815, $119. A solid but uninspiring filter plug-in collection for Adobe Premiere. *May 97, p. 118*

★★★★/8.3 **Final Effects AP 1.0,** MetaTools, 805/566-6200, $199. Ideal for Adobe Premiere-based particle generation and distortion. *May 97, p. 118*

★★★★/8.2 **HoloDozo 1.0,** M.M.M. Software, *holodozo@mmmsoft.com*, $149. Novel Adobe Premiere plug-in has a clever interface, uses QuickDraw 3D. *May 97, p. 118*

★★★★/8.9 **KPT Final Effects 3.0.1,** MetaTools, 805/566-6200, $695. This superb effects collection works with Adobe After Effects. *May 97, p. 118*

★★★★/8.9 **Lens Flare Pack 1.5,** Knoll Software, 415/453-2471, $129. This After Effects plug-in generates unmatched lens flare effects. *May 97, p. 118.* **Editors' Choice** for best After Effects plug-ins.

★★★/6.7 **LightWave 3D 5.0,** NewTek, 303/448-9700, $1495. Pro-level animation program lacks interface elegance. *May 97, p. 74*

★★★/5.4 **MovieTools 1.5,** McQ Productions, 415/348-1344, $195. Simple, precise QuickTime movie processing. *Apr 97, p. 72*

★★★/6.6 **Nisus Writer 5.0,** Nisus Software, 619/481-1477, $249. Renegade word processor is long on innovation, short on basics. *Apr 97, p. 56*

★★★/6.8 **PageMaker 6.5,** Adobe Systems, 408/536-6000, $895 (estimated). Even with a wealth of new features, still can't beat QuarkXPress. *May 97, p. 48*

★★★★/7.8 **QX-Tools 2.0,** Extensis, 503/274-2020, $99.95. Winning collection of XTensions gets even better. *Mar 97, p. 65*

★★★★/8.4 **Studio Effects 1.0,** MetaTools, 805/566-6200, $695. Adobe After Effects plug-ins include 3-D particle generator and great spotlight effects. *May 97, p. 118*

★★★★/7.0 **SuperCard 3.0,** Allegiant Technologies, 619/587-0500, $329 (estimated). Veteran authoring tool gets a cool Web plug-in; a few Web-related bugs. *May 97, p. 58*

★★★/6.4 **TransFX 1.0,** DigiEffects, 415/841-9901, $45. Inexpensive and fun transition collection for Adobe Premiere. *May 97, p. 118*

★★★★/7.5 **TypeCaster 2.0,** Xaos Tools, 415/538-7000, $199. 3-D text plug-in renders beautiful text that you can animate. *May 97, p. 118*

★★★/6.8 **Ultimatte for Macintosh 2.0,** Ultimatte, 818/993-8007, $1495. Complex, costly plug-in does an unmatched job of keying. *May 97, p. 118*

★★★/6.3 **UniQorn 1.2,** SoftPress Systems, 415/331-4820, $895. Easily turns print into Java-powered Web pages; features are still a bit sluggish. *Apr 97, p. 58*

★★★★/8.8 **Video SpiceRack 1.0,** Pixélan Software, 360/647-0112, $179. Novel plug-in collection has more than 300 transition and effect gradients. *May 97, p. 118*

UTILITIES

★★★★/7.5 **Adobe Type Manager Deluxe 4.0,** Adobe Systems, 408/536-6000, $99.95. The new ATM has font substitution and antialiasing. *Jun 97, p. 58*

★★★/6.8 **Adobe Type Reunion Deluxe 2.0,** Adobe Systems, 408/536-6000, $60. This font-menu manager has cool features but isn't as good as TypeTamer. *Jun 97, p. 58*

★★★★/7.5 **Audiotracer 1.0,** Optical Media, 408/376-3511, $99. CD-R mastering program designed for creating audio CDs. *Apr 97, p. 76*

★★★/5.8 **Bookends Plus 4.0,** Westing Software, 415/945-3870, $129. Reference manager adds powerful Web functions. *Jul 97, p. 76*

★★★/6.0 **Burn It 1.0,** Syncronys Softcorp, 213/340-4100, $29.95. Inexpensive but flawed security suite. *Apr 97, p. 69*

★★/3.8 **Common Ground 3.0.1,** Hummingbird Communications, 415/917-7300, $195. Portable document program can't match Adobe Acrobat. *Jul 97, p. 72*

★★★★★/9.3 **Conflict Catcher 4.01,** Casady & Greene, 408/484-9228, $99.95. The best start-up manager gets even better with this upgrade. *Jul 97, p. 62*

★★★★/7.6 **Cumulus Desktop 3.0,** Canto Software, 415/905-0300, $99.95. Affordable multimedia database offers power and a superior interface. *Jun 97, p. 68*

★★★/6.8 **Fetch 1.5,** Extensis, 503/274-2020, $99.95. Multimedia database has cool features but lacks flexibility and ease of use. *Jun 97, p. 68*

★★/3.0 **Front Office 1.6 LE,** STF Technologies, 816/220-0100, $59. A bad temp wouldn't garble your phone messages this badly. *Jun 97, p. 66*

★★/3.9 **Image Alchemy PS 2.1.4,** Handmade Software, 510/252-0101, $495. An expensive—and unreliable—solution to service-bureau crises. *Jul 97, p. 60*

★★★/5.7 **InfoGenie 2.0,** Casady & Greene, 408/484-9228, $79.95. Updated information manager adds links to Web browsers. *Jun 97, p. 84*

★★/3.8 **Internet Voice Mail 3.0,** VocalTec, 201/768-9400, $29.95. Internet Voice Mail has limited functionality and is full of bugs. *May 97, p. 80*

★★★★/8.8 **LetterRip 1.0.2,** Fog City Software, 408/454-1405, $295. Mailing-list server is simpler and cheaper than ListStar. *Jun 97, p. 77*

★★★★/8.3 **ListStar 1.1,** StarNine Technologies, 510/649-4949, $499. Serious mailing-list management with industrial-strength tools. *Jun 97, p. 77*

★★★★/7.2 **MAE 3.0,** Apple Computer, 408/996-1010, $459. Mac-in-the-box for Unix workstations. *Jun 97, p. 73*

★★★★/8.1 **MATLAB 5,** The MathWorks, 508/647-7000, $1795. Still the fastest route to solutions in industrial math. *Jul 97, p. 74*

★★★/6.4 **Now Utilities 6.5,** Now Software, 503/274-2810, $89.95. Incremental feature upgrades are no substitute for stability. *Mar 97, p. 74*

★★★★/7.2 **OmniPage Pro 7.0,** Caere, 408/395-7000, $499. OCR package has improved interface but not accuracy. *Jun 97, p. 83*

★★★/6.6 **Online Army Knife 1.2,** JEM Software, 303/422-4766, $69.95. Add-on spelling checker is fast and Internet-savvy but has some rough edges. *Jun 97, p. 62*

★★★★/7.4 **Pro FORTRAN 5.0,** Absoft, 810/853-0050, $899. Formidable compiler suite has faster compiled programs and a better debugger. *Jul 97, p. 80*

★★★★/8.2 **QuicKeys 3.5.2,** CE Software, 515/224-1995, $119. Macro maker's recent update adds native PowerPC speed. *Jul 97, p. 62*

★★/4.7 **SoftWindows 95 4.0,** Insignia Solutions, 408/

327-6000, $349 to $379 (estimated). Faster than before, but still no match for hardware solutions (or a PC). *Jul 97, p. 54*

★/2.6 **SpeechPrompter,** Orator Company, 619/420-9150, $89.95. Prompter software's jerky scrolling makes index cards look good. *Jun 97, p. 88*

★★★★/7.2 **Speed Doubler 2.0.1,** Connectix, 415/571-5100, $99. Upgrade boosts network transfer times, same speed as prior versions. *May 97, p. 52*

★★/4.8 **Spellswell Plus 2.1.1,** Working Software, 408/423-5696, $14.95. Add-on spelling checker doesn't live up to its name. *Jun 97, p. 62*

★★★/6.0 **SpellTools 1.2.1,** Newer Technology, 316/943-0222, $19.95. Add-on spelling checker has text-to-speech feature but no interactive checking, *Jun 97, p. 62*

★★/4.0 **Startup Manager 7.0,** Now Software, 503/274-2810, $55. Extension-management tool simply can't compare to the competition. *Mar 97, p. 61*

★★/4.0 **Tailor 2.0,** EnFocus Software, 303/393-7282, $369. A weak interface and unreliable performance hinder its troubleshooting talents. *Jul 97, p. 60*

★★/4.6 **Turbo Toolkit 1.0,** FWB Software, 415/463-3500, $79. Disk utility offers minor speedup. *Mar 97, p. 74*

★★★★/8.8 **Virex 5.7,** Datawatch, 508/988-9700, $99. Great virus-detection features, checks downloaded Internet files for viruses. *May 97, p. 78*

★★★★/8.0 **Wingz 2.1.1,** Investment Intelligence Systems Group, 913/663-4472, $399. Powerful programming tool disguised as a spreadsheet. *May 97, p. 71*

Hardware

DIGITAL CAMERAS

★★/3.9 **Casio QV-100,** Casio, 201/361-5400, $599. Camera produces poor-quality images with blown highlights. *Mar 97, p. 112*

★★★/5.8 **Casio QV-10A,** Casio, 201/361-5400, $399. Blown highlights and color cast problems mar images from camera. *Mar 97, p. 112*

★★★/6.6 **D-200L,** Olympus Image Systems, 516/844-5000, $599. Digital camera offers good image quality and a built-in flash. *Mar 97, p. 112*

★★★★/7.4 **D-300L,** Olympus America, 516/844-5000, $899. Low-cost camera with great picture quality. *Jul 97, p. 48*

★★/4.6 **DC20,** Kodak, 716/724-4000, $350. Pint-size camera contains no extras whatsoever. *Mar 97, p. 112*

★★/4.9 **DC25,** Eastman Kodak, 716/724-4000, $499. Clunky design overshadows this camera's good color and detail. *Jul 97, p. 48*

★★★/6.8 **DC50,** Kodak, 716/724-4000, $979. Good color, expandability, and an excellent zoom lens set the DC50 apart. *Mar 97, p. 112.* **Editors' Choice** for best entry-level digital cameras.

★★★★/7.1 **DSC-F1,** Sony Electronics, 408/432-0190, $849. Fun-to-use camera lacks removable storage—close second to the QuickTake 200. *Jul 97, p. 48*

★★★/6.0 **Epson PhotoPC,** Epson, 310/782-0770, $499. Digital camera's viewfinder doesn't show the whole image. *Mar 97, p. 112*

★★★★/7.1 **Fuji DS-7,** Fuji Photo Film, 914/789-8100, $699. Camera makes framing and reviewing photographs child's play. *Mar 97, p. 112.* **Editors' Choice** for best entry-level digital cameras.

★★★★/7.9 **PDC-2000-40,** Polaroid, 716/256-4436, $3695. Digital camera is difficult to use and not inexpensive, but produces extremely high-quality images. *Mar 97, p. 112.* **Editors' Choice** for best entry-level digital cameras.

★★★/6.1 **PhotoPC 500,** Epson America, 310/782-0770, $499. Offers fast file transfers and decent images, but poorly designed removable storage. *Jul 97, p. 48*

★★★/6.2 **QuickTake 150,** Apple Computer, 408/996-1010, $739. Oversized camera quickly downloads images. *Mar 97, p. 112*

★★★★/7.3 **QuickTake 200,** Apple Computer, 408/996-1010, $599. An ideal camera for newsletters and Web pages. *Jul 97, p. 48*

★★★/5.8 **RDC-2,** Ricoh, 702/352-1600, $999. Fair-to-middling image quality detracts from this camera's extras. *Mar 97, p. 112*

INPUT DEVICES

★★★★/8.5 **AlphaSmart Pro 2.1,** Intelligent Peripheral Devices, 408/252-9400, $269. Intelligent keyboard works as stand-alone input device. *Mar 97, p. 82*

★★★/5.2 **GlidePoint Keyboard,** Alps Electric, 408/432-6000, $139.95. Keyboard offers full set of keys with intuitive touchpad. *Apr 97, p. 60*

★★★/6.6 **NoHands Mouse,** Hunter Digital, 310/471-5852, $199.95. Foot-operated mouse offers a hands-free alternative. *Jun 97, p. 83*

★★★/5.5 **Stingray 4.0,** CoStar, 203/661-9700, $55. Trackball offers flexible design but limited programmability. *Feb 97, p. 70*

★★★/5.9 **TrackBoard and NumPad,** Datadesk, 206/842-5480, $99.95 to $139.95. Keyboard has a separate numeric keypad but only a small trackball. *Apr 97, p. 60*

★★★/5.2 **TrackMan Marble,** Logitech, 510/795-8500, $99. Restrictive design and unimpressive software. *Feb 97, p. 70*

★★★★/8.5 **Turbo Mouse 5.0,** Kensington, 415/572-2700, $110. MouseWorks software makes programmable trackball a standout. *Feb 97, p. 70*

MISCELLANEOUS HARDWARE

★★★★/7.0 **Apex,** Pinnacle Micro, 714/789-3000, $1995. King-size magneto-optical drive offers respectable speeds. *Apr 97, p. 54*

★★★★/7.5 **DynaTek CDM 4001,** DynaTek Automation Systems, 902/832-3000, $2889. Hard drive/CD-R combo unit simplifies CD-ROM mastering. *Mar 97, p. 78*

★★★/5.1 **FM Radio 1.1,** La Cie, 503/520-9000, $49.95. If you want to listen to the radio, you're better off buying a boom box. *Jun 97, p. 90*

★★★/5.0 **MessagePad 2000,** Apple Computer, 408/996-1010, $949. This Newton's finally useful, but it's priced out of the realm of sanity. *Jul 97, p. 69*

★★★/6.9 **OrangePC 540,** Orange Micro, 714/779-2772, $2456. Windows 95 compatibility card offers Pentium speed at a Pentium price. *Jul 97, p. 54*

★★★★/7.8 **Pilot,** Palm Computing, 415/237-6000, $249 to $299. Pocket PDA is small, swift, and sweet. *Apr 97, p. 48*

★★/4.7 **Pippin @World,** Bandai Digital Entertainment, 310/404-1600, $499.99; $69.99 for keyboard. Costly Internet-connection and games device has poor image quality. *May 97, p. 64*

★★★★/7.8 **Sagem Planet ISDN GeoPort Adapter,** Sagem, 408/446-8693, $395. ISDN terminal adapter breaks serial port speed barrier. *Mar 97, p. 66*

★★★/6.4 **WebRamp,** Trancell Systems, 408/988-5353, $899. ISDN router is easy to use, but missing some features. *Mar 97, p. 70*

★★★/6.8 **WebTV Internet Terminal,** Sony, 888/772-7669, $349.95; $79.95 for keyboard. Expensive, easy-to-use Internet-connection device has nice interface. *May 97, p. 64*

MODEMS/NETWORKS

★★★★/8.8 **4-Sight Fax 4.0,** 4-Sight Technologies, 515/221-3000, $795 for ten users. Flexible, reliable faxing on your network. *Apr 97, p. 57*

★★★/6.8 **Courier V.Everything 56 K,** U.S. Robotics, 847/982-5010, $395. If you're not ready for setup hassles, wait until 56K technology is more mature. *Jul 97, p. 67*

★★★/6.5 **DataShuttle 256,** RNS, 805/968-4262, $1395. Card allows superfast, two-line ISDN file transfers. *Jun 97, p. 75*

★★★★/8.6 **InterJet,** Whistle Communications, 415/577-7000, $1995 to $2395. All-in-one hardware-and-software combo gets your office on the Internet. *Jun 97, p. 60*

★★/4.8 **MultiModemZDXV,** Multi-Tech Systems, 612/785-3500, $269. Expensive average-performing 33.6-Kbps modem, no Mac software. *Apr 97, p. 123*

★★★/5.3 **MV.34MA,** Boca Research, 561/997-6227, $236. Cheap 33.6-Kbps modem offers fast, easy internet hookup. *Apr 97, p. 123*

★★★★/8.3 **Network Server 700/200,** Apple Computer, 408/996-1010, $11,800. Server offers networking horsepower and high-speed I/O. *May 97, p. 54*

★★★★/8.4 **QuickStream Pro,** Sonic Systems, 408/736-1900, $999. Remote-access server offers Web administration, eases telecommuting access. *Jul 97, p. 80*

★★★/6.6 **Quicktel II-C 33X-ASP-C-M,** Logicode Technology, 805/383-2500, $319. Fast 33.6-Kbps modem with innovative design, but a bit expensive. *Apr 97, p. 123*

★★/4.5 **SmartLink 3334AV,** Archtek America, 818/912-9800, $209. Poorly performing, reasonably priced 33.6-Kbps modem. *Apr 97, p. 123*

★/2.7 **SmartOne 336FLXMac,** Best Data Products, 818/773-9600, $179. Inexpensive 33.6-Kbps modem is one of the slowest. *Apr 97, p. 123*

★★★★/7.1 **Sportster 28.8/33.6 Faxmodem,** U.S. Robotics, 847/676-7010, $179 (estimated price). Affordable 33.6-Kbps modem offers best performance. *Apr 97, p. 123.* **Editors' Choice** for best 33.6-Kbps fax modem.

★★★/6.7 **SupraSonic 336V+,** Diamond Multimedia Systems, 360/604-1400, $249 (estimated price). Full-featured 33.6-Kbps modem isn't cheap but is really fast. *Apr 97, p. 123*

★★★/6.5 **TelePort Internet Edition 33.6,** Global Village Communication, 408/523-1000, $169 (estimated price). Fast 33.6-Kbps modem includes flash ROM and CCL scripts. *Apr 97, p. 123*

★★★★/8.2 **Workgroup Server 8550/200,** Apple Computer, 408/996-1010, $4200. An affordable 200-MHz medium-duty Internet server that's easy to use. *May 97, p. 54*

★★/4.9 **Zoom V.34X Plus,** Zoom Telephonics, 617/423-1072, $199. Average-performing 33.6-Kbps modem; long seven-year warranty. *Apr 97, p. 123*

PRINTERS

★★★/6.9 **Apple Color StyleWriter 1500,** Apple Computer, 408/996-1010, $249. Lackluster performance and image quality mark this color ink-jet. *Feb 97, p. 140*

★★★★/7.5 **Apple Color StyleWriter 2500,** Apple Computer, 408/996-1010, $349. Relatively fast color ink-jet has fair image quality. *Feb 97, p. 140*

★★★★/7.3 **BJC-4550,** Canon Computer Systems, 714/438-3000, $499. Ink-jet produces beautiful images with optional photo ink kit. *Feb 97, p. 140*

★★★/6.7 **Color LaserWriter 12/660 PS,** Apple Com-

continues

Star Ratings

puter, 408/996-1010, $6100 (estimated). Lower price and more RAM than its predecessor, but still middle of the pack. *Jun 97, p. 56*

★★★/6.9 **DeskJet 1600CM,** Hewlett-Packard, 408/246-4300, $1999. Expensive ink-jet printer offers good speed and crisp text. *Feb 97, p. 140*

★★★★/7.8 **DeskJet 870Cse,** Hewlett-Packard, 408/246-4300, $499. Outstanding color ink-jet for inexpensive office printing. *Feb 97, p. 140.* **Editors' Choice** for best office printer.

★★★★/7.8 **DeskJet 870Cse,** Hewlett-Packard, 408/246-4300, $599. Color ink-jet printer offers good speed and image quality. *Jun 97, p. 125*

★★★/5.9 **DeskWriter 600,** Hewlett-Packard, 408/246-4300, $199. Decent speed and average print quality at a nice price. *Feb 97, p. 140*

★★★★/7.2 **DeskWriter 680c,** Hewlett-Packard, 408/246-4300, $279. Color ink-jet offers above-average image quality. *Feb 97, p. 140*

★★★/6.9 **IBM Network Color Printer,** IBM, 404/238-1234, $8999. Its speed and output won't disappoint you, but it's not a good deal. *Jun 97, p. 56*

★★★/6.2 **LaserJet 5M,** Hewlett-Packard, 408/246-4300, $2229. Laser printer is easily upgraded and offers top-notch software. *Jun 97, p. 125*

★★★/6.0 **LaserJet 6MP,** Hewlett-Packard, 408/246-4300, $1149. Laser printer offers middling performance and excellent software. *Jun 97, p. 125*

★★★/6.0 **LaserWriter 12/640 PS,** Apple Computer, 408/996-1010, $1599. Laser printer has good speed and image quality for the price. *Jun 97, p. 125*

★★★/5.4 **MD-2010,** Alps Electric, 408/432-6000, $499. Low-end color printer is slow, with poor-quality output. *Feb 97, p. 140*

★★★/5.2 **Personal LaserWriter 4/600 PS,** Apple Computer, 408/996-1010, $899. This expensive laser printer is slow and has nonstandard memory. *Jun 97, p. 125*

★★★★/7.8 **Stylus Color 500,** Epson America, 310/782-0770, $279. Good price, output, and speed, but this color ink-jet is messy. *Feb 97, p. 140.* **Editors' Choice** for best home printer.

★★★★★/9.1 **Stylus Color 800,** Epson America, 310/782-0770, $449. Color ink-jet printer is fast with outstanding image quality. *Jun 97, p. 125.* **Editors' Choice** for best personal printer.

★★★/5.7 **TruPhoto,** Panasonic Interactive Media, 408/653-1888, $479.95. Digital photo printer offers instant snapshots, delayed gratification. *Apr 97, p. 64*

SCANNERS

★★★★/7.5 **Agfa StudioStar,** Agfa, 508/658-5600, $989. Graphics pros will treasure scanner's high-quality scans and powerful software. *Feb 97, p. 62*

★★/4.8 **Apple Color OneScanner 1200/30,** Apple Computer, 408/996-1010, $799. A big disappointment; offers little advantage over its lower-priced predecessor. *Feb 97, p. 62*

★★/3.3 **ArtiScan Z1-1200,** Tamarack Technologies, 714/744-3979, $699. Slow, unimpressive, noisy scanner can scan at 600 dpi and 30-bit. *Mar 97, p. 131*

★★/3.7 **ArtiScan Z1-600,** Tamarack Technologies, 714/744-3979, $499. Slow, unimpressive machine makes a rumbling noise while scanning. *Mar 97, p. 131*

★★★/5.1 **Color OneScanner 600/27,** Apple Computer, 408/996-1010, $549 (estimated). Sleek and compact, but can't compete with less-expensive models. *Mar 97, p. 131*

★★★★/8.4 **Epson Expression 636,** Epson America, 800/922-8911, $899 as tested. Low-cost color scanner gets the nod for all-around use. *Feb 97, p. 62*

★★/4.9 **HP ScanJet 5p,** Hewlett-Packard, 800/722-6538, $530. Attractive scanner marred by mediocre image quality and software. *Apr 97, p. 50*

★★/ 3.8 **ImageReader Elite,** Info, 408/538-2500, $399. Small, inexpensive scanner delivers mediocre performance. *Mar 97, p. 131*

★★/3.8 **ImageReader FB,** Info, 408/538-2500, $549. Painfully slow scanner with anemic software and awkward case design. *Mar 97, p. 131*

★★★★/7.1 **MCA S600C,** Mitsubishi Chemical America, 408/954-8484, $299. Document scanning gets colorized. *Jun 97, p. 78*

★★/3.8 **ScanAce II,** PacificImage Electronics, 310/214-5281, $899. Bulky scanner did well in color, gray-scale, and resolution tests. *Mar 97, p. 131*

★★/4.9 **ScanJet 4P,** Hewlett-Packard, 208/323-2551, $615. Outstanding color fidelity, but large, heavy scanner has weak software. *Mar 97, p. 131*

★★/3.8 **ScanMaker E3,** Microtek Lab, 310/297-5000, $329 (estimated). Inexpensive, but disappointing speed, color, and gray-scale test results. *Mar 97, p. 131*

★★/3.7 **ScanMaker E6,** Microtek Lab, 310/297-5000, $599. 30-bit color, but otherwise no better than the ScanMaker E3. *Mar 97, p. 131*

★★★/5.9 **ScanTouch 110,** Nikon Electronic Imaging, 516/547-4355, $299 (estimated). A relatively fast scanner, with good color fidelity and an attractive price. *Mar 97, p. 131*

★★★/5.3 **ScanTouch 210,** Nikon Electronic Imaging,

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516/547-4355, $699 (estimated). Slower and more expensive than the ScanTouch 110, but 600 dpi. *Mar 97, p. 131*

★★★★/7.1 **SilverScanner Pro**, La Cie, 503/520-9000, $499. Great low-cost scanner with compact design and good software. *Mar 97, p. 131*. **Editors' Choice** for best low-end scanners.

★★★/6.9 **SnapScan**, Agfa, 508/658-5600, $389 (estimated). Quiet, fast scanner has good scanning software. *Mar 97, p. 131*

★★★/6.6 **Vista-S12E**, Umax Technologies, 510/651-4000, $649. Fast, with minimal image noise, but the Vista S-6E is a better choice. *Mar 97, p. 131*

★★★★/8.4 **Vista-S6E**, Umax Technologies, 510/651-4000, $345 (estimated). Inexpensive scanner did well on most of our tests, has good software. *Mar 97, p. 131*. **Editors' Choice** for best low-end scanners.

STORAGE

★★★/5.7 **APS Q3200**, APS Technologies, 816/483-1600, $400 to $480. At 5400 rpm, this 3GB hard drive is not fast, but it is nicely priced. *May 97, p. 127*

★★★/6.4 **Barracuda 4LP**, Club Mac, 714/768-8130, $789 to $849. An ordinary-looking case masks a 7200-rpm, 2GB drive that screams. *May 97, p. 127*

★★★/5.7 **D2**, La Cie, 503/520-9000, $399. 2GB hard drive with some thoughtful touches is average speed. *May 97, p. 127*

★★★/6.5 **DCS 2150**, Direct Connections, 612/937-6283, $825. 2GB drive is a speed demon, whether connected internally or externally. *May 97, p. 127*

★★★/5.7 **DisKovery**, Optima Technology, 714/476-0515, $560. 2GB hard drive is an easy all-in-one solution. *May 97, p. 127*

★★★/5.4 **Fireball TM 21**, Quantum, 408/894-4000, $320. 2GB, 5400-rpm hard drive with clear installation instructions. *May 97, p. 127*

★★★/5.7 **Fireball TM 32**, Quantum, 408/894-4000, $433. 3GB, 5400-rpm internal hard drive with clear installation instructions. *May 97, p. 127*

★★★/6.1 **Hammer 2050iS Ultra**, StreamLogic, 818/701-8400, $919. Great performance, but pricey for a 2GB internal drive. *May 97, p. 127*

★★★/6.0 **PDI 2100WAV**, ProDirect, 612/941-1805, $699. 2GB drive is fast with a SCSI card, but average on the external bus. *May 97, p. 127*

★★★★/7.5 **PDI 3800**, ProDirect, 612/941-1805, $899. Big, fast, nicely priced 3.8GB hard drive. *May 97, p. 127*. **Editors' Choice** for best 2GB to 3GB hard drives.

★★★/6.1 **Seagate ST32171W**, Seagate, 408/438-6550, NP. An OEM drive tested for comparison, this 7200 rpm drive is fast. *May 97, p. 127*

★★★★/7.6 **SyJet**, SyQuest, 510/226-4000, $399 to $499 . Removable media drive that's faster than Jaz; easy setup. *May 97, p. 51*

★★★/5.2 **Tempest 3.2**, Club Mac, 714/768-8130, $399 to $459. 5400-rpm, 3GB drive that pales next to the competition. *May 97, p. 127*

★★★/5.9 **Tsunami**, La Cie, 503/520-9000, $499. Snazzy case, but 3GB hard drive's not that fast. *May 97, p. 127*

VIDEO DISPLAY

★★★/6.1 **AlphaScan 711**, Sampo Technology, 770/449-6220, $599. Unbeatable price for a great picture; limited color features and on-screen controls. *Jul 97, p. 117*

★★★/6.0 **AlphaScan 760**, Sampo Technology, 770/449-6220, $799. Screen is beautiful, but on-screen controls are ugly and not user-friendly. *Jul 97, p. 117*

★★★★/7.4 **AppleVision 1710**, Apple Computer, 408/996-1010, $799 (estimated). Fine picture, affordable price, plus excellent software control interface. *Jul 97, p. 117*

★★/3.9 **Crystal Lake 17**, Pacom Data, 408/764-0590, $549. Sharp picture and rock-bottom price, but limited features and controls. *Jul 97, p. 117*

★★★★/7.2 **Diamond Pro 87TXM**, Mitsubishi Electronics America, 714/220-2500, $829. Solid image quality, great controls—all at a realistic price. *Jul 97, p. 117*

★★★/5.5 **DJ702e-M**, Mag Innovision, 714/751-2008, $659. Good image quality and a good price, with cool hardware controls. *Jul 97, p. 117*

★★★/5.5 **DX700T-M**, Mag Innovision, 714/751-2008, $799. Sharp image, sensible controls, but picture's too dim to make the first rank. *Jul 97, p. 117*

★★★/6.2 **EO75-M**, Princeton Graphic Systems, 714/751-8405, $799. Terrific picture and low price with iffy controls and chintzy swivel. *Jul 97, p. 117*

★★★/5.8 **EO76-M**, Princeton Graphic Systems, 714/751-8405, $799. Despite poor on-screen controls, it's a fair deal with good picture and price. *Jul 97, p. 117*

★★★/6.5 **FlexScan FX-C5**, Eizo Nanao Technologies, 562/431-5011, $948. Good-looking, but has somewhat mystifying hardware controls. *Jul 97, p. 117*

★★★/6.7 **FlexScan TX-C7S**, Eizo Nanao Technologies, 562/431-5011, $1299. Excellent image quality and software interface, but it's exorbitantly expensive. *Jul 97, p. 117*

★★★★/7.0 **Mazellan 17PX**, Hansol Multitech, 714/562-5151, $899. Affordable, good image quality, highly functional hardware controls. *Jul 97, p. 117*

★★★/6.4 **Multigraph 447Xi**, Nokia Display Prod-

continues

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MACWORLD EDITORS' CHOICE

Macworld EDITORS' CHOICE ★★★★★

To buy smart when choosing Macintosh hardware or software, you need an expert's opinion. Fortunately, the experts at Macworld are more than willing to give you theirs. Just leaf through the pages of this issue — or any issue of Macworld. Wherever you see Editors' Choice, you can be sure the product has passed the most rigorous tests for performance and quality in its class. And comes out a winner.

Our reviewers scrutinize just about every Mac product that hits the market. If it wins us over, you can't go wrong.

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Star Ratings

ucts, 415/331-4244, $925. Great color and great controls, but the price is above average. *Jul 97, p. 117*

★★★/5.1 **Multiple Scan 1705 Display,** Apple Computer, 408/996-1010, $649 (estimated). Good image quality, but tends to bloom at high brightness. *Jul 97, p. 117*

★★★/6.8 **Multiscan 17sell,** Sony Computer, 408/894-0555, $999 (estimated). A slight magenta cast and high price tag, but otherwise a good choice. *Jul 97, p. 117*

★★★★/7.5 **Multiscan 200sf,** Sony Computer, 408/894-0555, $799 (estimated). Excellent quality display plus an elegant interface and surprisingly affordable. *Jul 97, p. 117.* **Editors' Choice** for best 17-inch monitor.

★★★★/7.3 **MultiSync P750,** NEC Technologies, 630/775-7900, $899 (estimated). Worth the money for its brilliant picture and great on-screen controls. *Jul 97, p. 117*

★★★/6.9 **MultiSync XV17+,** NEC Technologies, 630/775-7900, $749 (estimated). Richly colored picture and superb controls—a good bargain. *Jul 97, p. 117*

★★★★/7.1 **Optiquest V773,** ViewSonic, 909/869-7976, $599. The best combo of image quality and controls we've seen for under $600. *Jul 97, p. 117*

★★★/6.7 **PanaSync S17,** Panasonic Computer, 201/392-4500, $729. A sensible choice—good picture, controls, price, and support. *Jul 97, p. 117*

★★★/6.4 **PanaSync/Pro P17,** Panasonic Computer, 201/392-4500, $899. High-quality image, controls, and support. *Jul 97, p. 117*

★★★/6.9 **Pivot 1700,** Portrait Displays, 510/227-2700, $1099. Unique pivoting feature isn't cheap, but it's the only one in town. *Jul 97, p. 117*

★★★/6.4 **PT775,** ViewSonic, 909/869-7976, $999. Good image quality and controls, but price doesn't match performance. *Jul 97, p. 117*

★★★/5.3 **RasterOps SuperScan Mc 600,** Hitachi/NSA, 617/461-8300, $799. Slightly clunky controls but decent picture—a good choice for the budget-minded. *Jul 97, p. 117*

★★★/5.1 **RasterOps SuperScan Mc 611,** Hitachi/NSA, 617/461-8300, $949. Merely average image quality for the price, and hard-to-see controls. *Jul 97, p. 117*

★★★★/8.9 **Sony GDM-W900,** Sony Electronics, 408/955-5142, $4999. A wide-screen monitor for the color connoisseur. *Jun 97, p. 84*

★★★★/7.1 **SyncMaster 17GLi,** Samsung Electronics America, 201/229-4000, $789. Affordable, good-looking display with smart, snazzy controls. *Jul 97, p. 117*

★★★★/7.0 **SyncMaster 17GLsi,** Samsung Electronics America, 201/229-4000, $1019. Outperforms the 17GLi, has custom color controls, but at a big price hike. *Jul 97, p. 117*

★★★/6.8 **VisionMaster 17,** Iiyama North America, 215/957-6543, $799. Great image quality at a very good price; slightly convoluted controls. *Jul 97, p. 117*

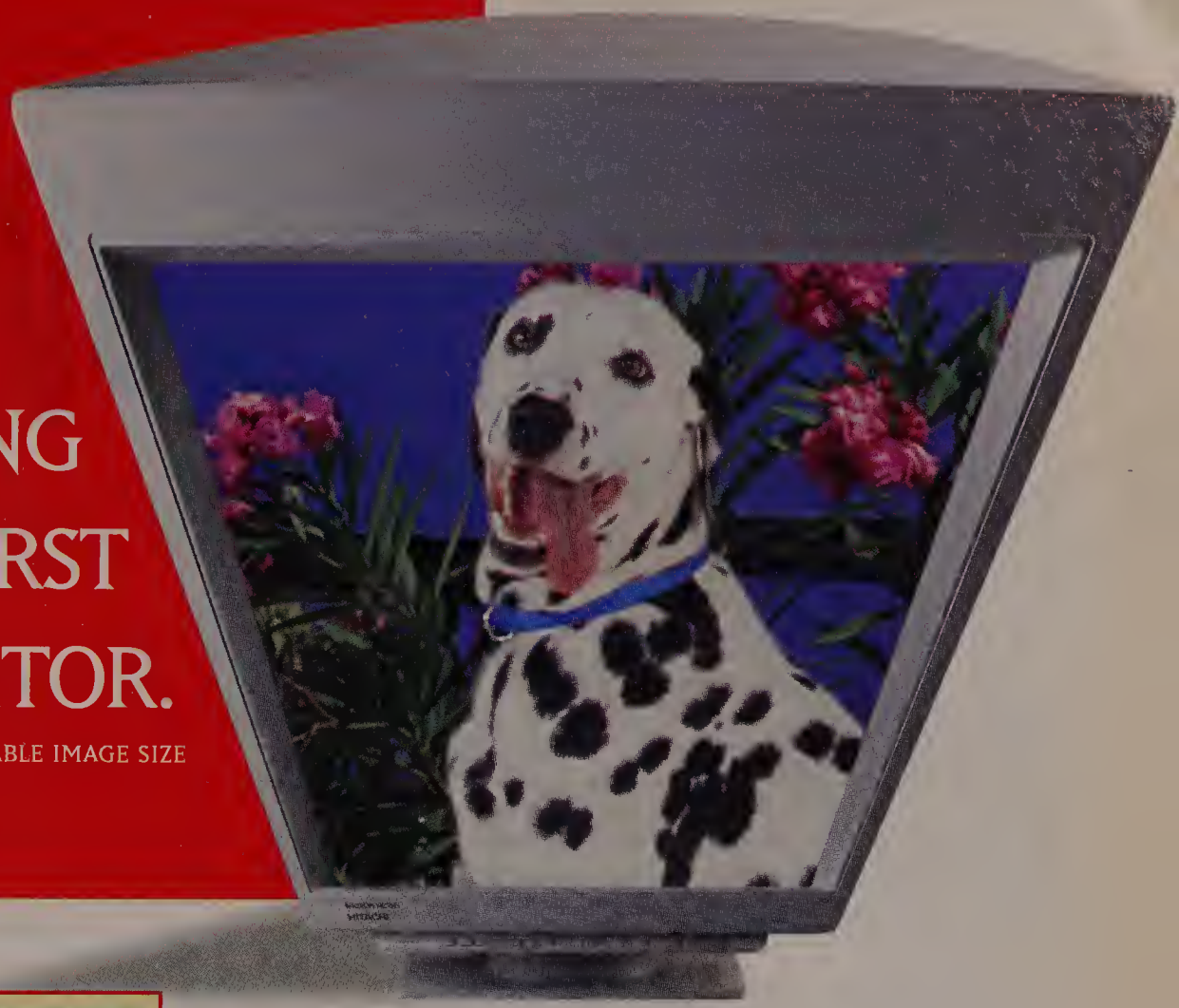
★★★★/7.2 **VisionMaster Pro 17,** Iiyama North America, 215/957-6543, $899. Beautiful, feature-rich, and sensibly priced; slightly confusing controls. *Jul 97, p. 117*

★★★/5.4 **Visual Sensations VS-9,** KDS, 714/379-5599, $753. Good-looking display, but inelegant controls and inflexible swivel stand. *Jul 97, p. 117*

★★★/5.5 **WyseVision WY-782D,** Wyse Technology, 408/922-4300, $949. Compelling picture and price, but marred by awkward controls. *Jul 97, p. 117* m

INTRODUCING THE WORLD'S FIRST 19" MONITOR.

18" VIEWABLE IMAGE SIZE



A breakthrough from Hitachi.

It's not just a new monitor size. It's new display technology that's got everything you ever wanted in a big screen monitor — better performance, smaller footprint, even the perfect price.

	HITACHI Mc 7515	SONY 20SEII
TUBE SIZE	19"	20"
PITCH	0.22 (H) 0.14(V)	0.25
MAX. REFRESH @ 1600 x 1200	75 Hz	75 Hz
SUGGESTED RETAIL	$1,149	$2,000

THE SONY IS AN INCH BIGGER BUT COSTS 74% MORE.

Get similar savings over other high-end 20 and 21 inch monitors as well.

The performance of the best 21" monitor.

The image quality of the new 19" RasterOps Mc 7515 is every bit as good as the best 21" monitor — and in some ways better. For example, its focus is a full 30% sharper than the previous state-of-the-art. Plus it delivers brighter, richer color and improved contrast at the same time.

It's also one of the few monitors of any size that gives you *genuine* 1600 x 1200 resolution — not a simulation. And one of fewer still that does it flicker-free to the VESA recommended 75 Hz refresh rate.

The new tube with multi-step dynamic focus and auto-astigmatism correction is also flatter than many CRTs so it displays a more accurate image with less distortion, even at screen edges and in the corners.

MONITOR	TUBE SIZE (Viewable size)	PITCH (mm)	1600 HORIZONTAL PIXELS?
NEC P750	17" (15.6")	0.25 mask	NO
SONY 17SEII	17" (16.0")	0.25 AG	NO
HITACHI Mc 7515	19"(18.0")	0.22 horiz.	YES (1672)
SONY 20SFII	20"(19.1")	0.30 AG	NO
VIEWSONIC GT800	20"(19.1")	0.30 AG	NO
MITSUBISHI 91TXM	21"(19.7")	0.28 AG	NO

Beware of monitors that claim 1600 x 1200 but lack a tube that can resolve 1600 horizontal pixels. Compare screens at 1600 x 1200 before you buy.

The footprint of a 17" monitor.

Look at the footprint and you're in for another surprise. The same technology that made our tube better also made it shallower — just 18.1". So it fits on narrower work surfaces.

And it's priced at just $1,149 (SRP*)

There's one more bonus to our new 19" tube technology. It's a lot less expensive to make so it goes for hundreds less than a comparable 20" or 21" monitor.

So if you want the resolution of a big screen monitor without the bulk and price of a conventional 20 or 21, you've got to see the new Mc 7515. Call for details and dealers near you. **800 441-4832.**

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*SRP — Suggested Retail Price

CDW	Club Mac	DTP Direct	Express Direct	Mac Connection	Mac Mall	Mac Market	Mac Warehouse	Mac Zone	PrePress Direct
800 800-4239	800 258-2622	800 311-7079	800 925-6777	800 800-2222	800 222-2808	800 223-4622	800 255-6227	800 248-0800	800 443-6600

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Mac Superguide

MACWORLD SELECTS THE BEST MAC OS SYSTEMS

Edited by Allyson Bates

Looking for a new Macintosh? Confused about what new model to buy? Look no further. Each month, the *Mac Superguide* provides *Macworld*'s picks for the best Mac OS systems. Typically we recommend an Editors' Choice winner and two runners-up. Current recommendations, however, may have changed from last month's based on the present lineup and price changes.

You'll also find *Macworld* Star Ratings and Macworld Lab performance benchmarks for all Mac OS systems shipping as we went to press in late May 1997. You may read about other Mac models in *Macworld* and elsewhere, but those are prototypes not yet available—the only systems rated here are those you can actually buy.

For previously reviewed Mac systems, the summaries reference the issue date and page number of the article. In some cases, such as faster versions of existing Macs, there is no full review and thus no cross-reference. New systems are indicated in the benchmark by the ▶ icon.

Prices from Apple, Motorola, DayStar, and Umax are company-estimated street prices. APS, Power Computing, and PowerTools sell direct. Unless otherwise noted, all pricing includes a keyboard and mouse, but not a monitor or modem.

For price comparisons, estimate spending about $800 for a 17-inch monitor, $175 for a modem, $100 for an extended keyboard, $50 for a mouse, $400 for a 2GB hard drive, $175 for 2MB of VRAM, and $100 for 16MB of RAM.

OFFICE SYSTEM

EDITORS' CHOICE

★★★★/8.6 **PowerCenter Pro 180** The new affordable 180 is superfast, with great features for all tasks. Subtract $100 for desktop version. Power Computing (512/388-6868): $2544, 32MB RAM, 1MB cache, 4MB VRAM (4MB maximum), 2.0GB hard drive, 16× CD, 2 free drive bays, 3 PCI slots. *Aug 97, p. 48*

EDITORS' CHOICE

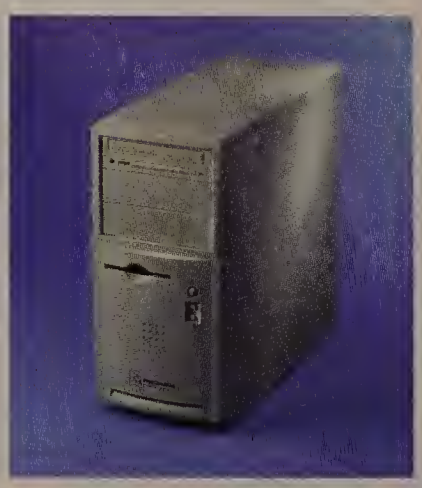
★★★★/7.3 **Power Macintosh 7300/180** The 7300/180 is a strong performer that's competitively priced and easily expandable. A great buy if you want the most bang for your buck. Apple Computer (408/996-1010): $2399, 16MB RAM, 256K cache, 2MB VRAM (4MB maximum), 2.0GB hard drive, 12× CD, 1 free drive bay, 3 PCI slots. *May 97, p. 100*

★★★★/7.2 **SuperMac J700/180** Similar to the 7300/180, the J700/180 distinguishes itself by having one more PCI slot, one more free drive bay, and more cache than the 7300/180. And now it's more affordable too. Umax Computer (510/226-6886): $1995, 16MB RAM, 512K cache, 2MB VRAM (4MB maximum), 2.1GB hard drive, 8× CD, 2 free drive bays, 4 PCI slots. *May 97, p. 100*

PORTABLE SYSTEM

EDITORS' CHOICE

★★★★/7.6 **PowerBook 3400c/200** It's almost twice as fast as a top-of-the-line Pentium portable yet costs just $500 more. A built-in modem and Ethernet port eliminate an expensive PC Card modem/Ethernet combo. However, the 3400c isn't perfect: it's expensive, it doesn't support multiple monitors, and its CPU isn't upgradable. Apple Computer (408/996-1010): $5495, 16MB RAM, 2.0GB hard drive, 6× CD, 12.1-inch active matrix LCD, 1 drive bay, 2 PC Card slots. *May 97, p. 50*



Power Computing's affordable new PowerCenter Pro 180 is this month's top pick for office Macs.

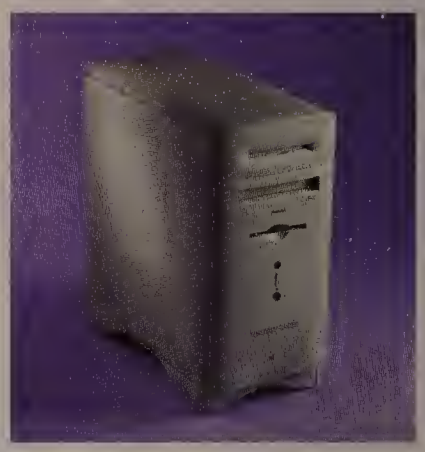
★★★/6.4 **PowerBook 1400cs/117** Apple's midrange notebook accommodates an optional CD-ROM drive. Price drops make it more affordable and a better system than the old 5300 series. The large LCD panel is nice, even though it's passive matrix. Apple Computer (408/996-1010): $2000, 12MB RAM, 750MB hard drive, optional 6× CD, 11.3-inch passive-matrix LCD, 1 drive bay, 2 PC Card slots ($3500 model 1400c/117 has active-matrix LCD and 1.0GB hard drive). *Jan 97, p. 58*

SMALL-OFFICE/HOME-OFFICE SYSTEM

EDITORS' CHOICE

★★★★/7.7 **PowerBase 240** Recent price cuts make the 240 a new Editors' Choice. Its pro-level performance, strong selection of features, and greater expansion capability make this tower system a great buy for consultants and small businesses. Power Computing (512/388-6868): $1599, 16MB RAM, 256K cache, 2MB VRAM (4MB maximum), 2.0GB hard drive, 8× CD, 3 free drive bays, 3 PCI slots. *May 97, p. 100*

★★★★/7.5 **Power Macintosh 6500/250** This blazingly fast new SOHO Macintosh is hardly upgradable and a bit pricey. However, Apple bundles top-notch features, including a Zip drive, with the 6500. Less expensive configuration available with 32MB RAM. Apple Computer (408/996-1010): $2600, 48MB RAM, 256K cache, 1MB VRAM (1MB maximum), 4GB drive, 12× CD, no free drive bays, two PCI slots, 33.6-Kbps modem. *Aug 97, p. 52*



The fast new Power Macintosh 6500/250 has cool features and lots of power, but it's expensive.

EDUCATION SYSTEM

EDITORS' CHOICE

★★★★/8.1 **Power Macintosh 5500/225** This new all-in-one Mac—available only to schools—is rich in features and performance. Same case, convenience, and price as the old 5400's, but with more power and 3-D capabilities. Apple Computer (408/996-1010): $1999 (only sold to schools), 16MB RAM, 256K cache, 2MB VRAM (2MB maximum), 2.0GB hard drive, 12× CD, no free drive bays, Ethernet card, internal stereo speakers, monitor included. *Aug 97, p. 52*

EDITORS' CHOICE

★★★★/7.4 **PowerBase 180** It's fast, *cheap*, and expandable, with 3-D video acceleration. This tower is a great buy for cash-strapped schools and students. Power Computing (512/388-6868): $999, 16MB RAM, 256K cache, 2MB VRAM (4MB maximum), 1.2GB hard drive, 8× CD, 3 free drive bays, 3 PCI slots. *May 97, p. 100*

IMAGE-EDITING AND 3-D GRAPHICS SYSTEM

EDITORS' CHOICE

★★★★/8.2 **PowerTower Pro 225** This expandable tower is ideal for all-around

PHOTOGRAPHS BY KEVIN CANDLAND

REAL PRODUCTS REAL RATINGS Reviews you can trust: Unlike other publications, Macworld rates only final shipping products, not prototypes. What we review is what you can actually buy. Outstanding ★★★★★ = 9.0–10.0 Very Good ★★★★ = 7.0–8.9 Good ★★★ = 5.0–6.9 Flawed ★★ = 3.0–4.9 Unacceptable ★ = 0–2.9

image editing and 3-D graphics. A multiprocessor-based Mac is faster for some key operations, but the PowerTower Pro 225 is faster and cheaper. Power Computing (512/388-6868): $3695, 32MB RAM, 1MB cache, 8MB VRAM (8MB maximum), 2.0GB hard drive, 16× CD, 6 free drive bays, 6 PCI slots. *Jun 97, p. 108*

EDITORS' CHOICE

★★★★/7.5 **Genesis LT 400+** The affordable LT 400+ is swift in multiprocessor (MP)–enabled programs. Photoshop users who use MP-accelerated filters all day will love it. DayStar Digital (770/967-2077): $4999, 32MB RAM, 512K cache, 4MB VRAM (4MB maximum), 2.0GB hard drive, 16× CD, 2 free drive bays, 6 PCI slots. *Jan 97, p. 108*

★★★★/7.5 **Genesis MP 800+** The ultimate Mac system speeds through programs such as Adobe PhotoShop and Strata Studio Pro Blitz. And the tower leaves plenty of room for upgrades with its seven bays and six PCI slots. DayStar Digital (770/967-2077): $10,818, 32MB RAM, 512K cache, 4MB VRAM (4MB maximum), 2.0GB hard drive, 16× CD, 7 free drive bays, 6 PCI slots. *Jun 97, p. 108*

PUBLISHING AND DESIGN SYSTEM

EDITORS' CHOICE

★★★★/8.4 **PowerCenter Pro 210** You can't go wrong with the new PowerCenter Pro 210. It costs less than high-end Macs with similar specifications, but it's a bit slower. Power Computing (512/388-6868): $2844, 32MB RAM, 1MB cache, 4MB VRAM (4MB maximum), 2.0GB hard drive, 16× CD, 2 free drive bays, 3 PCI slots. *Aug 97, p. 48*

EDITORS' CHOICE

★★★★/8.2 **PowerTower Pro 225** The fastest single-CPU Mac is great for publishing professionals—at a low price. Power Computing (512/388-6868): $3695, 32MB RAM, 1MB cache, 8MB VRAM (8MB maximum), 2.0GB hard drive, 16× CD, 6 free drive bays, 6 PCI slots. *Jun 97, p. 108*

★★★★/8.0 **SuperMac S900/225** Nearly as fast as the PowerTower Pro 225, but with fewer free drive bays. Umax Computer (510/226-6886): $3495, 32MB RAM, 512K cache, 8MB VRAM (8MB maximum), 2.1GB hard drive, 8× CD, 4 free drive bays, 6 PCI slots. *Jun 97, p. 108*

Recent price cuts make the SuperMac S900/225 an affordable Mac for publishing pros.

MULTIMEDIA AND VIDEO-CREATION SYSTEM

EDITORS' CHOICE

★★★★/7.5 **Genesis MP 800+** This expandable Mac speeds through multiprocessor (MP)–enabled programs such as Adobe Premiere. DayStar Digital (770/967-2077): $10,818, 32MB RAM, 512K cache, 4MB VRAM (4MB maximum), 2.0GB hard drive, 16× CD, 7 free drive bays, 6 PCI slots. *Jun 97, p. 108*

★★★★/8.0 **Power Macintosh 8600/200** Has cool built-in video for novice video creators. Clever case but slow CPU. Apple Computer (408/996-1010): $3200, 32MB RAM, 256K cache, 2MB VRAM (4MB maximum), 2.0GB hard drive, 12× CD, 1 free drive bay, Ethernet card, built-in video. *Aug 97, p. 50*

WEB AND INTRANET SERVER SYSTEM

EDITORS' CHOICE

★★★★/7.9 **PowerTower Pro 200** The second-fastest single-CPU Macintosh is great for Web serving. Power Computing (512/388-6868): $3195, 32MB RAM, 1MB cache, 8MB VRAM (8MB maximum), 2.0GB hard drive, 16× CD, 6 free drive bays, 6 PCI slots. *Jun 97, p. 108*

EDITORS' CHOICE

★★★★/7.8 **SuperMac S900/200** This speedy machine has many free drive bays. A great choice for someone shopping for a departmental or Web server. Umax Computer (510/226-6886): $2995, 32MB RAM, 512K cache, 4MB VRAM (4MB maximum), 2.1GB hard drive, 8× CD, 4 free drive bays, 6 PCI slots. *Jun 97, p. 108* m

Macworld LAB TEST

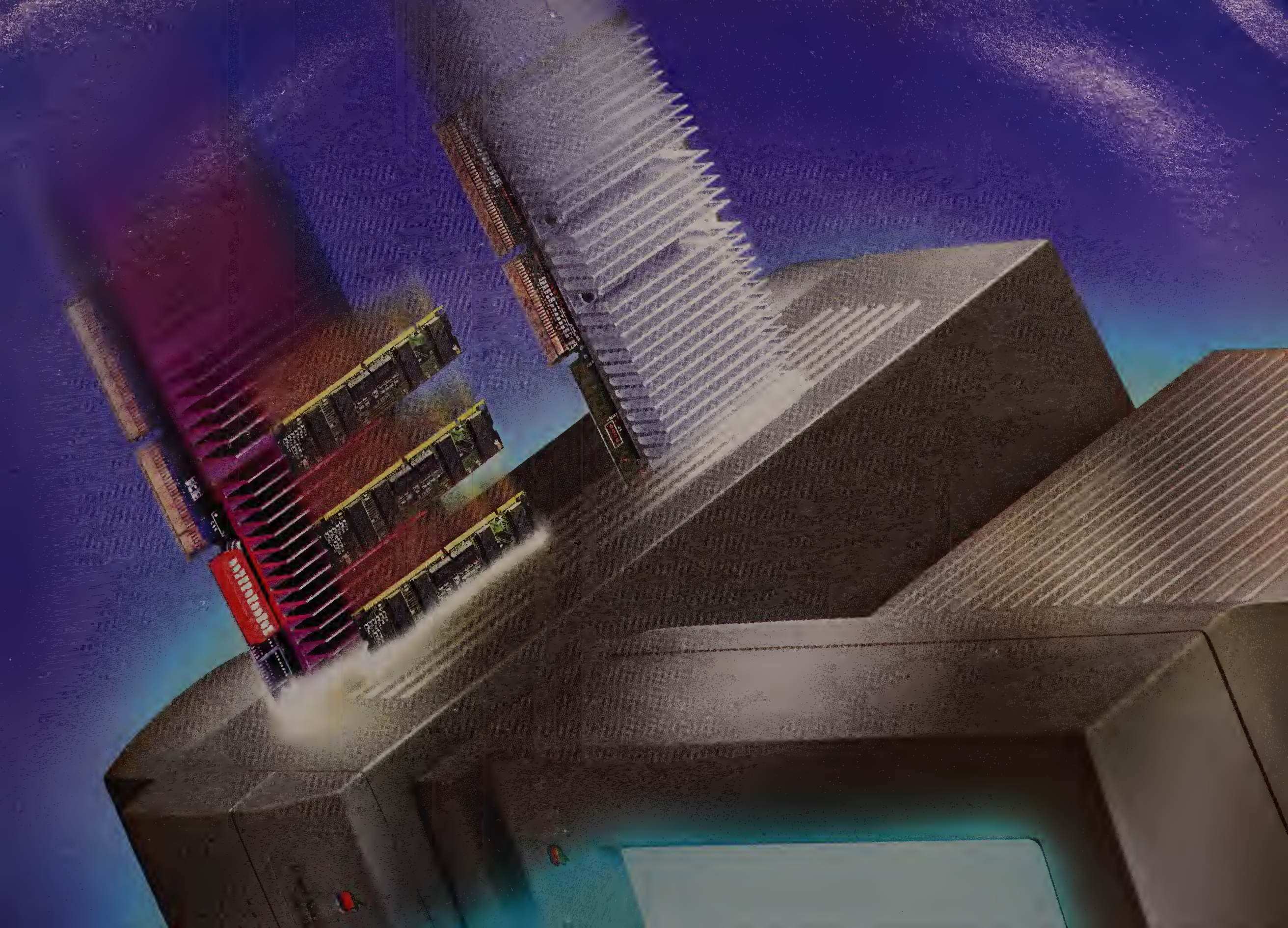
Every Shipping Mac Tested and Rated

► New this issue. Editors' Choice winners in red. Longer bars are better. Core results are times as fast as a Centris 650 (Centris 650 = 1.0). Multiprocessor results are times as fast as a Power Mac 9500/150 (9500 = 1.0). Only shipping systems are tested and rated.

	Core Mac Performance	Star Rating*
Apple Computer		
PowerBook 1400c/117**	2.7	★★★/6.4
PowerBook 1400cs/117**	2.8	★★★/6.4
PowerBook 1400c/133	3.5	★★★/6.6
PowerBook 3400c/180	5.0	★★★★/7.4
PowerBook 3400c/200	5.5	★★★★/7.6
Power Macintosh 4400/200	5.5	★★★/6.5
Power Macintosh 5260/120***	2.6	★★★/5.5
► Power Macintosh 5500/225***	6.8	★★★★/8.1
► Power Macintosh 6500/250	7.1	★★★★/7.5
Power Macintosh 7300/180	7.2	★★★★/7.3
Power Macintosh 7300/200	7.7	★★★★/7.6
Power Macintosh 8600/200	7.8	★★★★/8.0
Power Macintosh 9600/200	8.1	★★★★/8.0
► Power Macintosh 9600/233	9.4	★★★★/8.4
APS Technologies		
MPower 603e180	4.5	★★★/6.4
MPower 603e200	5.7	★★★/6.7
MPower 603e240	6.6	★★★/6.9
► MPower 604e200	8.0	★★★★/7.4
DayStar Digital		
Genesis LT 400+	7.7	★★★★/7.5
Genesis MP 400+	7.7	★★★★/7.5
Genesis MP 720+	7.3	★★★★/7.4
Genesis MP 800+	7.8	★★★★/7.5
Motorola Computer Group		
StarMax 3000 DT603e-180	5.4	★★★/6.2
StarMax 3000 MT603e-180	5.4	★★★/6.2
StarMax 3000 DT603e-200	5.8	★★★/6.5
StarMax 3000 MT603e-200	5.8	★★★/6.5
StarMax 3000 MT603e-240	6.8	★★★/6.8
StarMax 4000 DT604e-160	6.6	★★★/6.7
StarMax 4000 MT604e-160	6.9	★★★/6.7
StarMax 4000 DT604e-200	7.7	★★★/6.7
StarMax 4000 MT604e-200	7.7	★★★/6.7
Power Computing		
PowerBase 180	5.4	★★★★/7.4
PowerBase 200	5.8	★★★★/7.4
PowerBase 240	6.4	★★★★/7.7
PowerCenter 150	5.6	★★★★/7.0
► PowerCenter Pro 180	8.3	★★★★/8.6
► PowerCenter Pro 210	8.9	★★★★/8.4
PowerTower Pro 200	8.5	★★★★/7.9
PowerTower Pro 225	9.2	★★★★/8.2
PowerTools		
Infiniti 4200 Pro	8.2	★★★/6.9
Umax Computer		
SuperMac C500/180	5.2	★★★/5.9
SuperMac C600/200	5.8	★★★/6.2
SuperMac C600/240	6.3	★★★/6.5
SuperMac J700/180	7.3	★★★★/7.2
SuperMac S900/180DP	6.7	★★★★/7.1
SuperMac S900/200	8.3	★★★★/7.8
SuperMac S900/200DP	7.3	★★★★/7.3
SuperMac S900/225	8.8	★★★★/8.0
► SuperMac S900/233	9.0	★★★★/7.9

	Multiprocessor Performance	Star Rating*
DayStar Genesis LT 400+	2.1	★★★★/7.5
DayStar Genesis MP 400+	2.1	★★★★/7.5
DayStar Genesis MP 720+	2.6	★★★★/7.1
DayStar Genesis MP 800+	2.8	★★★★/7.5
SuperMac S900/180DP	1.8	★★★★/7.4
SuperMac S900/200DP	2.0	★★★★/7.3

*Based on features, implementation, innovation, performance, reliability, ease of use, and value. (See Star Ratings section for full explanation.) **Had less than 32MB of RAM, so some tests were conducted with virtual memory, which slows performance. ***Available only to educational institutions.



UPGRADE YOUR MAC

SUPERCHARGE YOUR SYSTEM

BY FRANKLIN N. TESSLER

WHETHER YOU'RE CRUNCHING A HUGE SPREADSHEET, SORTING A LONG MAILING LIST, OR RENDERING A COMPLEX 3-D DRAWING, A FASTER MAC CAN SAVE YOU TIME AND MONEY. BUT WITH SPEEDY NEW MODELS HITTING THE STREET EVERY FEW MONTHS, MAKING SURE THAT YOU HAVE THE FASTEST POWER MACINTOSH ON THE BLOCK IS LIKE CHASING A MOVING TARGET.

Although buying a new Mac may be reasonable for some people, it's an expensive proposition for most of us. Worse yet, you may not be able to use your existing memory or peripherals with a new model. Thankfully, there's plenty you can do to boost the performance of almost any Power Mac without purchasing a new computer. And while the last time we looked at upgrades we weren't enthusiastic ("Making the Move to Power Mac," February 1995), this time the results are more encouraging in terms of the payoff in speed.

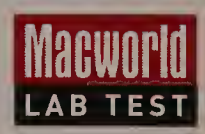
If you're thinking of stepping up, you have three simple options: replace your processor with a faster version, install a CPU booster to make your current processor work harder, or tweak your system with other hardware or software upgrades. To help you sort through the maze of choices, we looked at upgrade options for every PowerPC-based Macintosh and Mac OS clone ever sold. Macworld Lab tested a variety of CPU upgrade cards and CPU boosters for PowerPC computers to measure how closely the performance of an upgraded machine matches the performance of a new machine.

We limited ourselves to the PowerPC line for the simple reason that it's three years old, and most Macintosh users tend to get a new machine after three years (interestingly, PC owners generally buy a new machine every two years). If you have an older, 680X0-based Mac, such as a Quadra or Centris, it's time to get a new machine anyway, and take advantage of advancements in processor and bus speeds.

Install a Faster CPU

The most obvious target for boosting your Mac's speed is the central processing unit, or CPU. Every processor runs at a specific *clock rate*, which is usually specified in megahertz. For example, the PowerPC 601 chip in the first Power Mac 6100 chugged along at 60MHz, which is downright poky compared with the 300MHz processor in Apple's Power Mac 6500.

But you have to be careful, because CPU ratings don't tell the whole story. Two chips that run at the same rate aren't necessarily equivalent. For instance, the 604e microprocessor executes more instructions per cycle and sports larger on-board memory caches than the 603e. The net result: a 150MHz 604e executes instructions about 50 percent faster than a 150MHz 603e. A good rule of thumb is that if you have a 601 processor, or any processor under 150MHz, it's a prime candidate for upgrading.



Starting with the Power Mac 7500, Apple has offered removable CPU daughtercards to enable easy upgrading. This is a five-minute procedure that's no more difficult than installing memory: you gently pull the existing card from its socket and insert the new card. Because computers with CPU daughtercards are designed to be upgraded, there's little chance of breaking something and voiding your warranty, as long as you take reasonable care and don't apply too much force. Most vendors, including Apple and Umax Computer, offer daughtercard upgrades for their machines. Multiprocessor boards are also available from some companies, but only a handful of MP-aware applications take advantage of them. (See the table "CPUs and Boosters: Bumping Up Your Mac's Performance" for processor upgrade specifications and prices.)

In general, our tests show that computers upgraded with faster CPUs perform about as well as newer models with upgraded processors (see the benchmark, "Upgrades Become Viable: Great Speed Boosts").

If you avoid daughtercards with the fastest chips, which typically sell at a premium, you can still get a good deal. Resellers such as MacWorks (913/564-6100, *www.macworks.com*) routinely purchase overstock and discontinued CPU cards from Apple, then sell them at a discount. In some cases, you may even get a small trade-in allowance on your existing CPU. (For example, MacWorks sells a 150MHz 604/150 board for $259 and offers a $25 rebate if you return a working 604/120 or 604/132 daughtercard.)

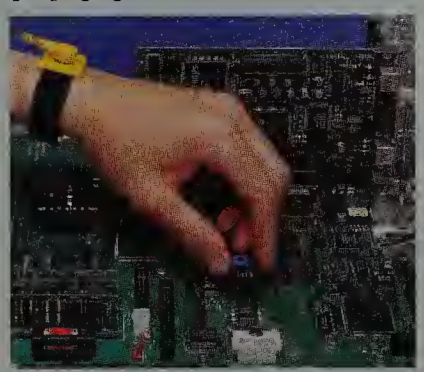
Other companies offer CPU upgrades with a twist. Newer Technology *(www.newertech.com)*, for example, squeezes extra performance out of its Maxpowr upgrade cards by letting you bump the clock rate of the computer's bus, the pathway used to exchange data between the CPU and other system components, such as memory and disk drives. Every logic-board design is certified by Apple to run at a specific bus speed, but a bus that's rated at only 50MHz may still work reliably at 60MHz; this is also true of CPU clocks, which we discuss in the clock-boosting section following. (The bus's speed rating depends on the computer's motherboard configuration. For example, the Alchemy design that is used in Power Computing's PowerBase computers is rated at 40MHz, while the bus in the Tsunami motherboard used in the PowerWave and PowerTower Pro series runs at 50MHz.)

On Newer's boards, the CPU runs at or slightly below its rated speed, which the company claims results in added reliability. Accelerator vendor XLR8 *(www.xlr8.com)* takes a slightly different tack. Like Newer's cards, XLR8's provides a faster CPU, but it also lets you adjust the processor to run at a higher speed than it's rated for, providing an extra performance kick. In our tests, however, XLR8's cards were more sensitive to factors like memory speed. According to XLR8, users get better performance by upgrading to XLR8's own cache.

Replacing the motherboard is another way to get a faster processor. But these upgrades rarely make economic sense, because buying a replacement board usually isn't much cheaper than getting a new computer. Over the years, most motherboard upgrades have disappeared from Apple's price list. If you look around, though, you may still be able to find motherboards for sale at computer stores, at trade shows, or from resellers such as Pre-Owned Electronics (617/275-4600, *dreamweaver.com/500/000411.htm*). Unless you come across an unusually good bargain, however, this type of upgrade isn't worth considering.

THE EVOLUTION OF UPGRADES

7100

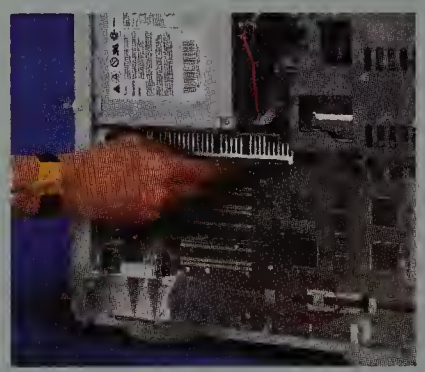


The Power Mac 7100's CPU is soldered onto the motherboard, so the only way to upgrade the system is to affix a clock chipper.

7500

You can upgrade a Power Mac 7500 CPU pretty easily. First you must remove the case and then lift the plastic protective panel.

9500



Upgrading a Power Mac 9500 is easiest of all. Just remove the case, take out the old CPU daughtercard, and insert a new one. You're set.

JOHN LUND

Install a Clock Booster

Frankly, this is one of the most controversial ways to increase CPU speed. While some users have benefited from this technique, it can also make your system unstable. Some companies that used to sell CPU boosters got out of the business for this reason.

This technique takes advantage of the extra performance margin that Motorola and IBM build into their chips. As processors roll off the production line, they're tested to verify that they'll run reliably at a specified speed, say 180MHz. But that doesn't mean that the processor isn't capable of running at a higher rate than the designated one.

So-called clock-chipping boosters use add-on circuits that push the CPU to run at a faster speed than it's rated for. Although early CPU boosters required permanent modification of the Mac's motherboard, most products on the market today don't require any soldering, so they can be removed. Variable-speed boosters usually consist of a small circuit board with a cable that clips onto the motherboard or processor card; fixed-speed accelerators are smaller. Their biggest advantage is low cost, especially compared with CPU upgrades.

Many accelerators let you adjust the CPU's speed to match your computer's maximum, since not all machines can be boosted to the same degree. You'll probably have to experiment to find the proper setting for your Mac, a process that can take several hours. While it's impossible to predict how much of a gain you can expect on a given computer, some models benefit more than others. For example, the Power Mac 7100/80 can't be pushed very far, because it was fully optimized; other models, including the Power Mac 6100 and 9500, benefit more from CPU acceleration.

Because running the processor at a higher speed generates extra heat, many CPU boosters also ship with cooling fans. Although there's little doubt that clock chipping works, the risks are open to debate. CPUs pushed beyond their rated limits may not function reliably over time, according to some vendors. They add that this problem particularly affects recent processors such as the 604.

Competing vendors counter that the worst possible outcome is that your boosted

Macworld LAB TEST

Upgrades Become Viable: Great Speed Boosts

The last time *Macworld* considered the possibility of upgrades (February 1995), we weren't pleased with what we found. Two years later, the situation is different. Easy swapping of CPU daughtercards and better CPU accelerators make upgrades a worthwhile investment. Compare the results of the reference platforms (in italics) with the accelerator and upgrade results, noting that we tested at both default and maximum speeds for the accelerators (the latter are denoted as max).

Best results in test. Longer bars are better. Results are times as fast as a Centris 650 (Centris 650 = 1.0). Products are listed from fastest overall to slowest overall. Systems in italics are for reference only.

	Overall Score	CPU-Intensive	FPU-Intensive	Disk-Intensive
Power Mac 9500/132 Upgrade Options				
Newer Technology Maxpowr 225 (240MHz, 60MHz bus) (max)	9.7	9.7	14.6	3.1
XLR8 Mach 225	9.0	9.0	13.4	3.2
Newer Technology Maxpowr 225 (45MHz bus)	8.9	9.0	13.1	3.1
Newer Technology Maxpowr 200 (210MHz, 60MHz bus) (max)	8.9	9.0	13.0	3.1
Power Mac 9500/200	*8.5*	*8.5*	*12.5*	*3.1*
Power Tools PDS 604e/200	8.3	8.4	12.3	3.1
Newer Technology Maxpowr 200 (50MHz bus)	8.3	8.5	12.2	3.0
Newer Technology Maxpowr 180 (180MHz, 60MHz bus) (max)	8.1	8.3	11.6	3.0
XLR8 Mach 180	8.0	8.1	11.6	3.1
Apple 180MHz upgrade card	8.0	8.1	11.5	3.0
Newer Technology Maxpowr 180 (45MHz bus)	7.9	8.1	11.3	3.0
DayStar Digital nPower 400+	7.8	8.0	11.1	3.0
XLR8 Warp Factor 175 (174MHz) (max)	7.1	7.5	9.5	3.0
Newer Technology Maxpower-MP 180	7.1	7.4	9.8	2.8
Other World OWC Afterburner 604 (168MHz) (max)	7.0	7.3	9.2	2.9
Trinity Works PowerTrip CPU Booster (168MHz) (max)	6.9	7.2	9.2	3.0
Power Tools PDS 604/150	6.3	6.6	8.2	2.8
Power Mac 9500/150	*6.2*	*6.5*	*8.1*	*2.8*
Power Mac 9500/132	*5.7*	*6.0*	*7.2*	*2.7*
Power Mac 7500/100 Upgrade Options				
Newer Technology Maxpowr 225 (240MHz, 60MHz bus) (max)	8.7	8.7	13.7	2.6
Newer Technology Maxpowr 225	7.7	7.7	12.2	2.4
Power Mac 7300/200	*7.7*	*7.9*	*11.5*	*2.3*
Newer Technology Maxpowr 200 (210MHz, 60MHz bus) (max)	7.7	7.6	12.3	2.4
XLR8 Mach 225	7.7	7.6	12.2	2.5
Newer Technology Maxpowr 180 (180MHz, 60MHz bus) (max)	7.5	7.7	11.0	2.4
Power Tools PDS 604e/200	7.4	7.4	11.4	2.4
Newer Technology Maxpowr 200	7.4	7.3	11.5	2.4
Apple 180MHz upgrade card	7.3	7.6	10.7	2.4
Power Mac 7300/180	*7.2*	*7.3*	*10.9*	*2.2*
Newer Technology Maxpowr 180	7.2	7.4	10.3	2.4
DayStar Digital nPower 400+	7.2	7.3	10.5	2.3
XLR8 Mach 180 (172MHz) (max)	7.0	7.3	10.2	2.3
Newer Technology Maxpowr-MP 180	6.5	6.7	9.4	2.2
Power Tools PDS 604/150	5.6	5.8	7.6	2.2
Apple 120MHz upgrade card	5.1	5.4	6.5	2.1
Power Mac 7600/120	*5.1*	*5.3*	*6.6*	*2.5*
Power Mac 7500/100	*3.5*	*3.3*	*5.5*	*2.1*
Power Mac 7100/80 Upgrade Options				
Trinity Works Universal PowerPak CPU Booster (87MHz) (max)	3.4	3.4	4.6	1.7
XLR8 Warp Factor 135 (86MHz) (max)	3.3	3.3	4.7	1.6
Power Mac 7100/80	*3.1*	*3.1*	*4.2*	*1.6*

Behind Our Tests

Macworld Lab tested several functions in eight key applications plus the Finder to determine real-world performance for the three critical performance areas faced by most users. The CPU-intensive tasks evaluate the Mac's essential computing performance; the FPU-intensive tasks gauge performance for operations that take advantage of the floating-point unit; and the disk-intensive tasks gauge the performance you'll get launching programs, opening and closing files, and copying files. We then average the results to determine the overall score, giving the CPU-intensive score 60 percent of the weight and the FPU and disk scores 20 percent each. All systems were tested with 32MB of RAM and run with eight-bit color on 17-inch monitors.—**Macworld Lab testing supervised by Mark Hurlow**

Macintosh will crash if you try a CPU setting that's too high. Apple representatives caution that users who clock chip do so at their own risk. But admittedly, power users—even Apple employees—have done this for years, with varying degrees of success.

Although CPU boosters technically void the computer's warranty, there's not much that Apple or any other vendor can do if you completely remove the card before sending your computer in for warranty service. But you need to take care not to damage anything when you're installing the card, a dicey proposition inside the cramped quarters of a PowerBook.

Tweak Your System

Before you take the plunge and upgrade your CPU, there are a few additional steps you can take to wring more performance from your setup.

Update Your Software Because new releases of the Mac OS sometimes boast better performance, it's wise to keep your system software up-to-date. And even if you're pretty satisfied with the way your computer runs now, you should investigate the latest versions of your favorite software. In some cases, upgrad-

CPUs and Boosters: Bumping Up Your Mac's Performance

Company	Product	Systems [A]	Company's Estimated Street Price	Speed (in MHz)
Apple Computer 408/996-1010	180MHz upgrade card	CPU-upgradable Power Macs	$600	180
DayStar Digital 770/967-2077	nPower 360+ [B]	Power Mac 7500, 7600, 8600, 9500, 9600	$1499	180
	nPower 400+ [B]	Power Mac 7500, 7600	$1799	200
	nPower 400+ [B]	Power Mac 8500, 9500; Umax J700 and S900	$1799	200
DVC 417/889-5113	Equalizer 6100/7100/8100	Power Mac 6100, 7100, 8100	$80	variable; 60/66 up to 80+, 80 up to 90+, 100 and 110 up to 126
	Equalizer 7600/8500/9500	Power Mac 7600, 8500, 9500	$99	120 up to 140–150, 132 up to 150–160, 150 up to 170
MacWorks 913/564-6100	120MHz upgrade card	Power Mac 7500, 7600, 8500, 9500	$49	120
	132MHz upgrade card	Power Mac 7500, 7600, 8500, 9500	$99	132
	150MHz upgrade card	Power Mac 7500, 7600, 8500, 9500	$199	150
Newer Technology 316/943-0222	Maxpowr [C]	CPU-upgradable Power Macs	$798	180
	Maxpowr [C]	CPU-upgradable Power Macs	$1195	200
	Maxpowr [C]	CPU-upgradable Power Macs	$1395	225
	Maxpowr-MP [B]	CPU-upgradable Power Macs	$1695	180
	Maxpowr-MP [B]	CPU-upgradable Power Macs	$1895	200
Other World Computing 815/338-8658	OWC Rocket 601	Power Mac 6100, 7100	$50	80
	OWC Afterburner 604	Power Mac 8500, 9500	$60	120 up to 146–156, 132 up to 168
Output Enablers 510/841-4883	Rocket Socket	Power Mac 6100	$50	82
	Rocket Socket	Power Mac 7100	$50	82
	Rocket Socket	Power Mac 8100	$50	100 up to 123, 110 up to 125
PowerLogix 512/795-2978	PowerBoost Mach 6	Power Mac 6100, 7100, Radius 8100	$99	60 up to 80–87, 66 up to 78–84, 110 up to 120–130
	PowerBoost Mach 7	Power Mac 7200	$179	110–120
	PowerBoost Mach 9	Power Computing PowerTower, PowerCenter (all)	$179	120 up to 145–165
	PowerBoost Mach 9R	Power Mac 7600, 8500, 9500, Power Computing PowerWave	$179	132 up to 150–165, 150 up to 165, 166 up to 180–185, 180 up to 200–230, 200 up to 220–230, 225 up to 250–260
Power Tools 512/891-0646	PDS 604/150	CPU-upgradable Power Macs	$499	150
	PDS 604e/200	CPU-upgradable Power Macs	$999	200
Sonnet Technologies 714/261-2800	Power Booster 80MHz	Power Mac 6100, 7100	$49	80
	PowerPC 604/150 Accelerator	Power Mac 7300, 7500, 7600, 8500, 8600, 9500, 9600	$299	150
	PowerPC 604/200 Accelerator	Power Mac 7300, 7500, 7600, 8500, 8600, 9500, 9600	$799	200
Trinity Works 512/249-1099	PowerPak 6100-80	Power Mac 6100	$50	80
	PowerPak 7100-80	Power Mac 7100	$80	80
	PowerTrip CPU Booster	Power Mac 7600, 8500, 9500	$100	variable
	Universal PowerPak CPU Booster	Power Mac 6100, 7100, 8100	$90	60/66 up to 84, 80 up to 93, 100 up to 126
Umax Computer 510/226-6886	SuperMac 603e/200 Processor Card	SuperMac C500, C600	$449	200
	SuperMac 603e/240 Processor Card	SuperMac C500, C600	$699	240
	SuperMac 604e/180 ASPD Secondary Processor Card	SuperMac S900	$995	180
	SuperMac 604e/200 ASPD Secondary Processor Card	SuperMac S900	$1195	200
	SuperMac 604e/225 ASPD Primary Processor Card	SuperMac J700, S900	$1195	225
XLR8 512/346-2557	HyperSpeed [D]	Power Mac 7200, 7500	$149	90 up to 112–120, 100 up to 118–128
	Mach 180 [C]	CPU-upgradable Macs	$679	180
	Mach 200 [C]	CPU-upgradable Macs	$1049	200
	Mach 225 [C]	CPU-upgradable Macs	$1299	225
	Warp Factor 135	Power Mac 6100, 7100, 8100	$79	66 up to 78–96, 80 up to 84–94, 100 and 110 up to 120–135
	Warp Factor 135 Pro [D]	Power Mac 6100, 7100, 8100	$119	66 up to 78–96, 80 up to 84–94, 100 and 110 up to 120–135
	Warp Factor 175	Power Mac 7600, 8500, 9500	$149	175
	Warp Factor 175 Pro [D]	Power Mac 7600, 8500, 9500	$149	148–175

[A] Not all MHz ratings of all processors are upgradable (for instance, the 7100/80 may not be upgradable, even though the 7100/66 is). Confirm with the vendor that your processor is upgradable. [B] Dual 604e CPUs; works only with multiprocessor software. [C] Adjustable bus or CPU speed. [D] Up to 300 settings.

ing to a PowerPC-native program can produce a startling improvement. (Of course, not all updated applications are faster than their predecessors, particularly if they incorporate extra features.) If you have access to the World Wide Web, you can keep track of changes to commercial software and shareware on the Version Tracker Web Page (*www.versiontracker.com*).

At the same time, some third-party add-on utilities, such as Connectix Speed Doubler (415/571-5100, *www.connectix.com*), which provides faster emulation of the 680X0 instruction set for nonnative programs, can make your system more responsive for only about $55.

Add RAM This is perhaps the simplest step you can take to speed up your Mac. Extra RAM lets you avoid using virtual memory, which uses your computer's relatively slow hard drive instead of much faster silicon chips. With virtual memory disabled, your Mac runs more quickly and smoothly, an especially important consideration if you play games or work with QuickTime movies.

Although RAM prices have rebounded a little since reaching an all-time low last year, memory is still a bargain at around $6 per megabyte. (The RAMWatch Page [*www.macresource.pair.com*] updates the price of memory chips on a regular basis.) A good starting point for most people is 32MB, but you should consider adding more RAM if you use memory-hungry programs like Adobe Photoshop or if you often run several applications at the same time. If you're planning a significant RAM purchase, it's a good idea to buy high-speed (60-nanosecond) memory. You'll be able to retain it when you move up to a faster CPU, which makes it a worthwhile investment.

Add External Cache Many PowerPC-based systems also come with another type of memory called *external cache* that can boost your system's performance. (The external cache is optional in some models; in others, such as Apple's Power Mac 9600, it's soldered on the logic board and can't be upgraded. (See the table "How Upgradable Is Your Mac?" for a list of external cache options for each model.) Cache cards, which plug into a special slot on the motherboard, come in 256K, 512K, and 1MB configurations, with 512K cards currently selling for around $120.

Installing or replacing the external cache can make your Mac faster, but the speed gain tends to be small if you already have ample system memory and a relatively slow processor; faster microprocessors often benefit more from external cache. Some computer models, such as Apple's Power Mac 7500, are notoriously sensitive

TEN WAYS TO RECYCLE YOUR MAC

Whether you're thrifty or just sentimental, if you have a pre-PowerPC Mac stashed in your closet, it can do more for you than collect dust. Here are ten good roles for a 680X0 Mac; some of the best come courtesy of network managers who responded to an Internet survey conducted by *Macworld*. | HOWARD BALDWIN

1 Overnight Backup

If you back up overnight, hook up your tape-backup system to a 68020-based Mac running Dantz Development's Retrospect 3.0 ($149 [street]; 510/253-3000, *www.dantz.com*).

2 Fax Server

You can combine an older modem running at 2400 bps with an older 68030-based Mac to get yourself a fax server with software such as STF Technologies' Faxstf 3.2.3 ($69 [street]; 816/220-1772, *www.stfinc.com*).

3 Front-Desk Sign-In

Put a 680X0-based Mac at your front desk and make the sign-in sheet electronic. Use Claris FileMaker Pro ($199 [street]; 408/987-7000, *www.claris.com*) to track visitors and deliveries.

4 Answering Machine

Use a Mac to take telephone messages. Plug in a phone and a voice-fax modem to a 68040-based Mac running Cypress Research's MegaPhone 2.0 ($49 [street]; 408/486-7900, *www.cypressr.com*), a 68020-based Mac running Bing Software's PhonePro 3.1 ($299 [street]; 714/888-4733, *www.bingsoftware.com*), or a 68040-based Mac running STF Technologies' Front Office ($59 [street]). STF is renovating Front Office, so we suggest you wait for the next version.

5 Internet Downloads

You can connect a group of modems together (this is called multiplexing) and attach them to a Mac to handle overnight downloads from the Internet.

6 Recycle the Hard Drive

Install the Mac OS, installers, and diagnostics on a Mac's hard drive, remove it, and put it into an external case. Whenever you have trouble with a Macintosh, boot it up from this drive and run the diagnostics. You can also use this approach to gain a secondary storage device.

7 Database Searches

To avoid having database reports tie up your main Mac, use an older Mac as a database front end. Let it do the searching and reporting so you can get on with your own work.

8 Program Debugger

If you're a software developer, you can use an old Mac (even an SE or a Classic) as a debugging terminal.

9 Kids' Companion

Buy yourself a new machine, taking advantage of their high speeds and low prices, and give your kids the hand-me-down for their games and homework.

10 Tax Write-Off

What is old-fashioned to you may be high-tech to a school or nonprofit organization. Include the manuals and installation disks, and you can take a deduction for the fair-market value of the equipment. You can track used-Mac prices at the American Computer Exchange Web site (*www.amcoex.com*) . . . or heck, you could just sell it.

Model	CPU	CPU Speed (in MHz)	External Cache (in K, unless otherwise indicated)	Minimum Built-in RAM (in MB)	Maximum RAM (in MB, unless otherwise indicated)	Replaceable CPU
Apple Computer (408/996-1010)						
Power Macintosh 4400/160	603e	160	optional	none	96	○
Power Macintosh 4400/200	603e	200	256	none	160	○
Power Macintosh 5200/75 LC	603	75	256	none	64	○
Power Macintosh 5260/100	603e	100	256	none	64	○
Power Macintosh 5260/120	603e	120	optional	none	64	○
Power Macintosh 5300/100 LC	603e	100	256	none	64	○
Power Macintosh 5400/120	603e	120	optional	8	136	○
Power Macintosh 5400/180	603e	180	optional	8	136	○
Power Macintosh 6100/60	601	60	optional	8	72	○
Power Macintosh 6100/60AV	601	60	optional	8	72	○
Power Macintosh 6100/66	601	66	256	8	72	○
Power Macintosh 6100/66 DOS Compatible	601	66	256	8	72	○
Power Macintosh 6100/66AV	601	66	256	8	72	○
Power Macintosh 6400/200	603e	200	256	8	136	○
Power Macintosh 6500/225	603e	225	256	64	136	●
Power Macintosh 6500/250	603e	250	256	32	136	●
Power Macintosh 6500/275	603e	275	512	32	136	●
Power Macintosh 6500/300	603e	300	256	64	136	●
Power Macintosh 7100/66	601	66	optional	8	136	○
Power Macintosh 7100/66AV	601	66	optional	8	136	○
Power Macintosh 7100/80	601	80	256	8	136	○
Power Macintosh 7100/80AV	601	80	256	8	136	○
Power Macintosh 7200/120	601	120	optional	none	256	○
Power Macintosh 7200/120 PC Compatible	601	120	optional	none	256	○
Power Macintosh 7200/75	601	75	optional	none	256	○
Power Macintosh 7200/90	601	90	optional	none	256	○
Power Macintosh 7300/180	604e	180	256	none	512	●
Power Macintosh 7300/200	604e	200	256	none	512	●
Power Macintosh 7500/100	601	100	optional	none	512	●
Power Macintosh 7600/120	604	120	256	none	512	●
Power Macintosh 7600/132	604	132	256	none	512	●
Power Macintosh 8100/100	601	100	256	8	264	○
Power Macintosh 8100/100AV	601	100	256	8	264	○
Power Macintosh 8100/110	601+	110	256	8	264	○
Power Macintosh 8100/80	601	80	256	8	264	○
Power Macintosh 8100/80AV	601	80	256	8	264	○
Power Macintosh 8500/120	604	120	256	none	512	●
Power Macintosh 8500/132	604	132	256	none	512	●
Power Macintosh 8500/150	604	150	256	none	512	●
Power Macintosh 8500/180	604e	180	256	none	512	●
Power Macintosh 8600/200	604e	200	256	none	512	●
Power Macintosh 9500/120	604	120	512	none	768	●
Power Macintosh 9500/132	604	132	512	none	768	●
Power Macintosh 9500/150	604	150	512	none	768	●
Power Macintosh 9500/180MP	604e (2)	180	512	none	768	●
Power Macintosh 9500/200	604e	200	512	none	768	●
Power Macintosh 9600/200 *	604e	200	512	none	768	●
Power Macintosh 9600/200MP *	604e (2)	200	512	none	768	●
Power Macintosh 9600/233 *	604e	233	512	none	768	●
Macintosh PowerBook 1400c/117	603e	117	none	16	64	○
Macintosh PowerBook 1400c/133	603e	133	128	16	64	○
Macintosh PowerBook 1400cs/117	603e	117	none	12	64	○
Macintosh PowerBook 3400c/180	603e	180	256	16	144	○
Macintosh PowerBook 3400c/200	603e	200	256	16	144	○

● = yes, ○ = no. * Cache not upgradable.

to the specifications of the memory chips in the external cache, so make sure the vendor offers a money-back guarantee. (Symptoms of a faulty external cache include frequent, random crashes and difficulty booting.)

As a general rule, a 256K external cache is fine for systems with a 601 or 603 processor, and a 512K cache should work well for 604-based machines operating at less than 200MHz. If you have a faster CPU or if you do a lot of programming, consider getting a 1MB cache.

Buy a New Mac While buying a new Mac is the most expensive solution, it's also the one guaranteed to get you as close to a state-of-the-art machine as possible. In the last three years, if you've bought new, you've been able to take advantage of such advancements as RISC processors, PCI buses, and the latest operating-system versions. This also makes particular sense if you're looking for features that are missing from your current model, such as built-in Ethernet, internal video digitizing, or extra slots. While there's always a twinge when you get rid of an old friend, there are plenty of worthwhile purposes for used computers (see the sidebar "Ten Ways to Recycle Your Mac").

One side benefit of buying a new computer is that you'll probably get a beefier and faster hard disk and a faster CD-ROM drive. (Unless your existing CD-ROM drive is rated at 2× or slower, however, you may not notice much of a difference in performance.) Another plus is that you get a system with brand-new components and a fresh warranty. Also, newer Macs sometimes incorporate updated motherboard designs that make the computer faster, more reliable, and even more upgradable.

If you have an older

NuBus-based computer such as the 6100, 7100, or 8100, trading up to a PCI-bus computer will also let you take advantage of add-in PCI boards such as graphics accelerators. Though you may be tempted to retain your NuBus investment, remember that PCI cards tend to be cheaper since they work in both Macs and PCs. And you can still preserve your investment in NuBus cards with Second Wave Computing's (512/329-9283, *www.2ndwave.com*). Xpans PN200 external expansion chassis system, which lets you use NuBus cards with PCI-based Macs.

Macworld's Buying Advice

So what should you do if you're saddled with a Mac that seems too slow, and you don't have an unlimited budget? If your computer is only two or three years old, a faster processor offers the best compromise between cost and performance. CPU accelerators provide the most bang for your buck, but try them only if you're not squeamish about tinkering inside the Mac and you don't mind fiddling with speed settings.

On the other hand, if you're looking for a speed boost that's truly plug-and-play—and your computer has a replaceable CPU—buy a faster processor card (consider adding RAM, too, now that it's so cheap). In Macworld Lab's tests, Newer Technology's Maxpowr boards came out ahead in performance and stability. You may not end up with the fastest Mac on the block, but you'll at least be guaranteed a year or two before you're faced with yet another upgrade dilemma. **m**

FRANKLIN N. TESSLER is a radiologist and *Macworld* contributing editor whose 7500/120 seems slower every day.

How Upgradable Is Your Mac? [CONTINUED]

Model	CPU	CPU Speed (in MHz)	External Cache (in K, unless otherwise indicated)	Minimum Built-in RAM (in MB)	Maximum RAM (in MB, unless otherwise indicated)	Replaceable CPU
Macintosh PowerBook 3400c/240	603e	240	256	16	144	○
Macintosh PowerBook 500 with PowerPC	603e	100	none	8	40	○
Macintosh PowerBook 5300/100	603e	100	none	8	64	○
Macintosh PowerBook 5300c/100	603e	100	none	8	64	○
Macintosh PowerBook 5300ce/117	603e	117	none	16	64	○
Macintosh PowerBook 5300cs/100	603e	100	none	8	64	○
Macintosh PowerBook Duo 2300c/100	603e	100	none	8	56	○
APS Technologies (816/483-1600)						
MPower 603e180	603e	180	none	16	160	○
MPower 603e200	603e	200	256	16	160	○
MPower 604e200	603e	200	512	16	160	○
MPower 603e240	604e	240	512	24	160	○
DayStar Digital (770/967-2077)						
Genesis LT 400+ *	604e (2)	200	512	16	1GB	●
Genesis MP 400+ *	604e (2)	200	512	16	1.5GB	●
Genesis MP 720+ *	604e (4)	180	512	16	1.5GB	●
Genesis MP 800+ *	604e (4)	200	512	16	1.5GB	●
Motorola Computer Group (800/759-1107)						
StarMax 3000/160	603e	160	256	16	160	○
StarMax 3000/180	603e	180	256	16	160	○
StarMax 3000/200	603e	200	256	16	160	○
StarMax 3000/240	603e	240	256	16	160	○
StarMax 4000/160	604e	160	512	16	160	○
StarMax 4000/200	604e	200	512	16	160	○
Power Computing (512/388-6868)						
PowerBase 180	603e	180	256	16	160	●
PowerBase 200	603e	200	256	16	160	●
PowerBase 240	603e	240	256	16	160	●
PowerCenter Pro 180	604e	180	1MB	16	512	●
PowerCenter Pro 210	604e	210	1MB	16	512	●
PowerCenter 150	604	150	512	16	512	●
PowerTower Pro 225MP	604e (2)	225	1MB	32	1GB	●
PowerTower Pro 250MP	604e (2)	250	1MB	32	1GB	●
PowerTower Pro 225	604e	225	1MB	32	1GB	●
PowerTower Pro 250	604e	250	1MB	32	1GB	●
PowerWave 604/120	604	120	512	16	512	●
PowerWave 604/132	604	132	512	16	512	●
PowerWave 604/150	604	150	512	16	512	●
PowerTools (512/891-0646)						
Infiniti 4200 Pro	604e	200	512	24	160	●
Umax Computer (510/226-6886)						
SuperMac C500/160	603e	160	256	16	144	●
SuperMac C500/180	603e	180	256	16	144	●
SuperMac C600/180	603e	180	256	16	144	●
SuperMac C600/200	603e	200	256	16	144	●
SuperMac C600/240	604e	240	256	24	144	●
SuperMac J700/150	604e	150	512	16	1GB	●
SuperMac J700/180	604e	180	512	24	1GB	●
SuperMac S900/150	604e	150	512	16	1GB	●
SuperMac S900/180	604e	180	512	32	1GB	●
SuperMac S900/200	604e	200	512	32	1GB	●
SuperMac S900/225	604e	225	512	32	1GB	●
SuperMac S900/233	604e	233	512	32	1GB	●
SuperMac S900/180DP	604e (2)	180	512	32	1GB	●
SuperMac S900/200DP	604e (2)	200	512	32	1GB	●

● = *yes*, ○ = *no*. * *Cache not upgradable.*

Web Publishing Made Easy

by Deke McClelland

No programming required: ten new Web authoring packages

IN MANY RESPECTS, I'M TYPICAL OF THE MILLIONS OF SMALL-BUSINESS OWNERS AND JUST-PLAIN USERS TRYING TO FORGE A PRESENCE ON THE INTERNET. I RELY ON A 28.8-KBPS MODEM, I'M TOO BUSY TO CHECK MY E-MAIL ON A REGULAR BASIS, AND I HATE MY SERVICE PROVIDER, BUT I'M TOO LAZY TO CHANGE. YET, MORE THAN A YEAR AGO, I—A CONFIRMED COMMUNICATIONS IDIOT—POSTED THE FIRST VERSION OF MY PERSONAL WEB SITE.

If you, too, want to create your own site, my advice is to learn one of the new breed of WYSIWYG page-authoring programs. Sure, you could code the page manually in HTML, as many have before you. For a programming language, HTML is about as easy as it gets. All you do is type a few standard commands (called tags) into a text document, and the tags tell a browser how to format the document and where to link it. But saying that HTML is easy compared with, say, BASIC, is like claiming that poking a sharp stick in your ear doesn't hurt as much as jabbing one into your eye. Whatever its relative merits, the net experience remains unpleasant.

As desktop publishers discovered long ago, it's better to see what you're making as you make it. This way, you can add text and graphics, modify them, and react to every action in real time. The benefits are particularly significant for part-time Web authors who want to create an effective personal or small-business site without watching their efforts spiral into yet another time-draining, energy-sucking hole. If you fall into this camp, then you'll be relieved to hear that the new Web layout tools are easy to learn, reliable, and efficient, and they're improving rapidly.

Adobe Systems' PageMill (*www.adobe.com*), with its simple design and abundance of convenient features, started the WYSIWYG site-making trend in late 1995. While PageMill still earns one of

our two Editors' Choice recommendations, its lead is vulnerable as a steady stream of competitors challenge its dominance. These challengers range from derivative makeovers such as Claris Home Page (*www.claris.com*) and Symantec Visual Page (*www.symantec.com*) to a new breed of precision design tools chartered by NetObjects' Fusion (*www.netobjects.com*) and refined by GoLive Systems' CyberStudio (*www.golive.com*).

I evaluated ten shipping WYSIWYG Web-page authoring tools and one entry that was still in beta, Netscape Communications' Communicator (*www.netscape.com*). In my tests, I emphasized ease of use, quick access to features, reliable previewing capabilities, and functionality.

The newest trend in Web-page editors is glitz—piles of high-end features aimed at professional content producers that have little bearing on the needs of the just-plain folks who do most of the living and linking on the Web. So rather than concentrating on what the programs do, I looked at how they do it; specifically, how they handle four fundamental tasks:

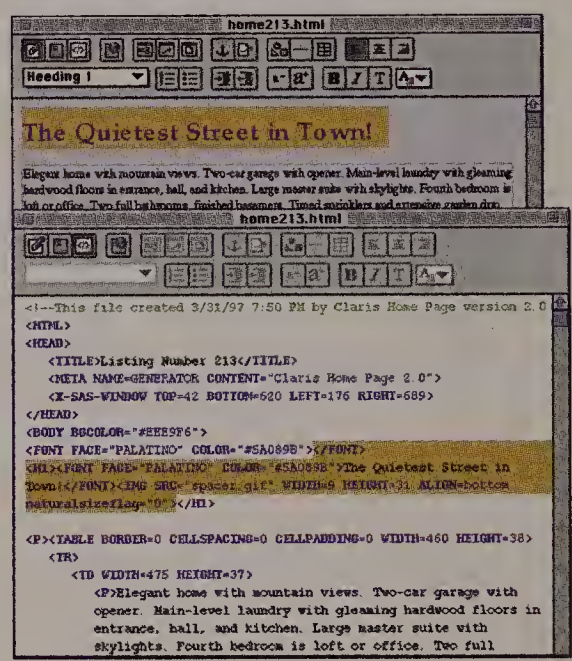
- formatting text,
- creating and editing tables,
- building client-side image maps,
- assembling frames.

I've also outlined a few of the programs' specialty capabilities—such as whether they import QuickTime movies, offer site management, or upload your site to a server—in the table, "What Web Authoring Tools Can Do for You." As you read the table, remember that the best programs for building personal sites are not necessarily the ones that pack in the most features, but those that handle the day-to-day stuff with the smallest amount of exertion.

Text in a World without Style

Text is the biggest part of most Web pages. So it's ironic that HTML offers about as many formatting options as a manual typewriter. You can't control the space between lines or letters, you can't justify type, and type sizes are limited to a very few. With so few formatting options, it's important to select a program that makes its small collection of text-handling functions as convenient as possible.

Hiding HTML's Limitations Globetrotter Web Publisher 1.1.1 from Akimbo Systems (*www.akimbo.com*) takes the most unusual approach to text editing. Like NewSoft's Presto Personal Page 2.5 (*www.tophat.com*; version 3.0 was slated to ship in summer) and Netscape Communicator 4.0, Globetrotter lists type sizes in points, a more familiar standard than HTML's 1 through 7 tags. But where Personal Page and Communicator offer just a few size options—each of which corresponds to an HTML size—Globetrotter lets you apply any point size, with predefined settings up to 108 points. (HTML's top size, 7, is equivalent to 36 points, assuming default browser settings.)



See the Source Code Claris Home Page 2.0 is the only program that lets you select a portion of a Web page and then switch to that exact bit of HTML source code. Even if you're intimate with HTML, this simple trick is a huge time-saver.

Globetrotter can automatically convert text to graphics, allowing text to grow as large as you like. But this automation depends entirely on typeface, and you have to enter the font name manually into an option box to invoke the conversion. In theory, this attempt to hide the intricacies and limitations of HTML is admirable, but in practice it invites wasted effort and permits more opportunities for disappointment when your text comes out as 36-point Times Roman instead of 92-point Helvetica despite your best efforts.

Positioning Text NetObjects Fusion 1.0 attacks type from a print publisher's perspective. (NetObjects Fusion 2.0 should be available in early summer.) The program was the first to recognize that the biggest frustration designers have with HTML is its inability to position a text block with any sort of precision on the page. Type and graphics merely follow each other in linear succession, with paragraph and line breaks bestowing a modicum of order.

Fusion bucks the trend by supplying every page with a grid on which you can draw and position text blocks with complete precision. You can even nudge a selected block with an arrow key. Fusion performs this layout miracle by creating a bunch of HTML tables around your page elements when you output the finished page. NetObjects says Version 2.0 will reduce the amount of disk space this nested-table approach takes and shorten the increased download time it creates.

Basic Text at Its Best Of the software I tested, the best programs for text editing are Claris Home Page 2.0 for its straightforward convenience and GoLive CyberStudio 1.0 for its unrivaled control.

Like PageMill 2.0, Home Page lets you drag in text from SimpleText or the Scrapbook, change the color of type from a menu, and apply common formatting functions from the keyboard. But unlike PageMill or Symantec's rival Visual Page 1.0, Home Page lets you specify a typeface. Just be sure to select a common one such as Helvetica or Palatino. If your visitors don't have the font you request loaded on their systems, they'll see the browser's default font.

My favorite feature is a little off the beaten track but still important: when you switch to the view that shows the HTML source code, Home Page highlights the tags for the selected item, helping you locate an area of interest quickly (see the screen shot "See the Source Code").

Grid Redux CyberStudio adopts Fusion's grid approach, but with more practical success. Where Fusion is barely capable of opening an existing HTML file—among its problems is that it ignores alignment and loses graphics (leaving behind placeholders)—CyberStudio not only opens Web pages intact, but also offers to convert conventional table layouts to grids.

You can also create multiple grid boundaries on a single page, an excellent way to divide your page and keep areas independent from each other without resorting to frames. And CyberStudio supports Macintosh drag and drop, a basic function missing from the more expensive Fusion.

Arrange Elements into Tables

If you're a newcomer to Web authoring, you might think of tables as simple spreadsheets, but HTML tables are actually much more powerful. Because you can specify their height and width, align elements inside cells, and even have cells cross multiple rows and columns, tables can serve as anything from column guides for body copy to grids for graphics.

The typical method for creating a table in a WYSIWYG editor doesn't vary much. Click on a button, enter a number of rows and columns, and the table's ready to go. Most programs also automatically scale cells to accommodate the length of text blocks or graphics.

Tables in a Hurry The one exception is DeltaPoint's QuickSite 1.0 (*www.deltapoint.com*), which lets you use tables for spreadsheets and nothing more. The closest thing to a one-minute site-creation tool, QuickSite handles tables the way it handles all other page elements: it shows you a dialog box, asks you to fill it out, and throws the whole thing together in the time it takes to say, "Would you like fries with that?" The results aren't beautiful—in fact, they can be downright hideous—but they're fast.

Tables at Their Worst While tables are easy to create, some programs make them a chore to edit.

Microsoft's FrontPage 1.0 (*www.microsoft.com*) is the foremost example of a cumbersome table editor. Because FrontPage includes OLE (Microsoft's Object Linking and Embedding protocol) among its 20 compulsory system extensions—that's right, 20—you can drag spreadsheets in from Microsoft Excel. But that's where the fun ends.

FrontPage offers a tangled Table menu that's nearly as long as its counterpart in Microsoft Word, replete with Select and Insert operations that are satisfied by a click or two in other programs. Extending a cell across two rows shoves other cells out of the way, resulting in little tumors hanging off the right edge of the table. The simple act of changing a cell color involves a dialog box that consumes a 13-inch monitor screen. And where every other program lets you resize a table by dragging a corner handle, FrontPage makes you plug in a

6 ESSENTIAL STEPS FOR WEB AUTHORS

Generally speaking, I'm a big fan of WYSIWYG Web authoring programs, but just because they automate the HTML page-creation process doesn't mean they do everything. Here are six things you should do to save time and aggravation when using an HTML editor.

1 ORGANIZE YOUR SITE AHEAD OF TIME.

The biggest mistake new computer users make is to save their files in random locations, making it difficult to find them later. So it figures that this is a big problem for first-time Web designers as well. To avoid this problem, organize your entire site inside one folder. You can have as many subfolders as you like, just so long as the index.html file is inside the main folder.

2 OBSERVE NAMING CONVENTIONS.

Many of us take the Mac's free-form naming conventions for granted. But on the Web you have to use extensions such as *.html* and *.gif*. Avoid punctuation, except the period before the extension. And to avoid conflicts with case-sensitive operating systems such as Unix, stick with lowercase letters and numerals.

3 HAVE GRAPHICS 100 PERCENT READY TO GO.

Many of the WYSIWYG editors I reviewed can convert PICT and TIFF graphics to GIF and JPEG formats. Although this might seem helpful, it also can be very dangerous. It means the editor has to create a separate GIF or JPEG file somewhere on your hard drive—and chances are, it won't be in a good place.

Your best bet is to use Adobe Photoshop or some other image editor to prepare each graphic exactly the way you want it to appear before you add it to a page.

4 HAVE A GIF SPACER HANDY.

A "GIF spacer" is a transparent GIF file that's just a few pixels tall and wide. Make a tiny empty file in Photoshop or some other image editor, then save it as a GIF 89a graphic and make the color white transparent.

The exact size doesn't matter because you can scale it inside your editor. Just keep it small so it downloads fast.

Use GIF spacers for paragraph spacing, indents, and alignment tweaks. Two programs—GoLive Systems' CyberStudio and NetObjects' Fusion—come equipped with predefined spacers, but if you're using any of the other programs, keep your own spacer close at hand.

5 TEST OUT YOUR PAGE IN A REAL BROWSER.

You wouldn't send an electronic document to a commercial printer without first testing it out on your desktop printer, would you? Nor should you trust the version of a page that your editor shows you.

It's a good idea to keep copies of Netscape Navigator and Microsoft Internet Explorer on your hard drive and open every page you create before posting it for the whole world to see. You'll be amazed at the simple things that can go wrong.

6 LEARN HOW TO CODE.

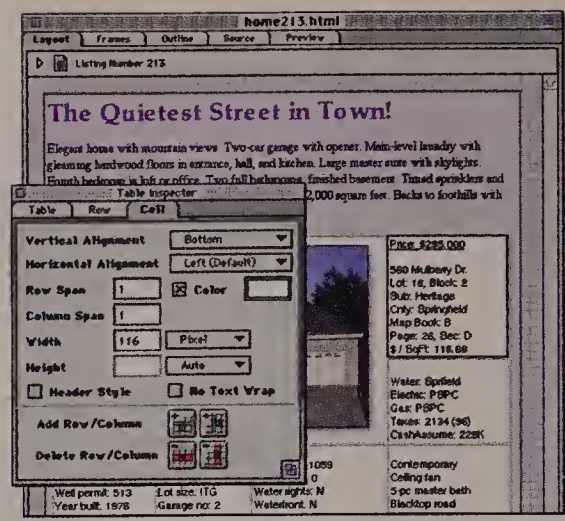
Web editors are still learning from each other's mistakes, and every one of them doesn't come through in some respect or other. When things don't go according to plan, be ready to fine-tune your page with a few choice HTML tags. You can use SimpleText or any other word processor you have lying around. But the favorite solution of most Web aficionados is Bare Bones Software's BBEdit 4.0 ($119; 617/778-3100, *www.barebones.com*).

numerical Width value.

Fusion and CyberStudio constantly set up tables in the background to accommodate your layout. But otherwise, Fusion is one of the most limited packages when it comes to table editing. You can't mix graphics and text in the same cell, you can't merge neighboring cells, and you can't undo the deletion of a row or column. It's as if Fusion reckons you aren't quite qualified to mess with tables when it already has that job covered.

Better Formatting CyberStudio, on the other hand, treats tables like full citizens. It offers easily accessible controls for width, height, span, and multiple other cell attributes (see the screen shot "Incredible Table Control"). The program also responds instantaneously to requests—considerably faster than Fusion or FrontPage.

Among the under-$150 crowd, PageMill edges out the competition for its intuitive approach to table editing. Although it doesn't permit you to control the height of a table or cell—as Home Page and Visual Page do—PageMill collects all functions in a single streamlined palette. Joining and splitting cells are a breeze, and you can add a row or column as simply as option-dragging a divider line. I wish you could assign a numerical width value to an entire row, as you can in Home Page and Visual Page, but otherwise PageMill has them beat.



Incredible Table Control In addition to devising invisible HTML tables that align text blocks and graphics to a grid, CyberStudio provides a thorough and well-organized collection of user-accessible table-editing options. I defy you to find a cell-formatting function not represented in this palette.

Image Maps: Put Links into Graphics

Image maps permit you to create multiple buttons (called hot spots) inside a single graphic. If a visitor sees something of interest inside a graphic, he or she has only to click on that area to link to a page with more information. Image maps are also popular navigational tools, serving as graphical indexes for many Web sites.

The most popular kind of image map these days is the client-side map, which can be created entirely in HTML. (You don't need a separate script file, as you do when creating the more archaic server-side maps.) Although mind-numbingly difficult to program in raw HTML—you have to specify the coordinate position of points around the outside of each and every hot spot—image maps are cake in a WYSIWYG editor.

The Mapless Ones At least, they should be. Alas, three programs, QuickSite, Communicator, and Personal Page, provide no tool for creating image maps—though NewSoft says Personal Page 3.0 will remedy this problem. If you want to subdivide an image into a bunch of buttons with one of these programs, you have to slice and dice the image prior to importing it and assign each fragment a separate link. Or you can use a Web-savvy graphics program such as Adobe Illustrator 7.0 to create a client-side image map and import it as a GIF graphic.

Maps without Mercy Of the programs I tested that support image maps, some programs do it better than others. "Others" include Globetrotter Web Publisher, FrontPage, and Fusion, which

What Web Authoring Tools Can Do for You

					TEXT HANDLING				TABLES		IMAGE MA
Company	Product	Star Rating[A]	List Price	Phone Number	Specify Typeface/ Size	Check Spelling	Search and Replace Text	Supports Macintosh Drag and Drop	Automated Table Generation	Cell Can Span Multiple Rows or Columns	Client-Side Image Maps
	EDITORS' CHOICE										
Adobe Systems	PageMill 2.0	★★★★/7.4	$149.00	408/536-6000	○/●	●	●	●	●	●	●
Akimbo Systems	Globetrotter Web Publisher 1.1.1	★★/4.1	$99.00	510/843-6888	●/●	●	●	●	●	○	●
Claris	Home Page 2.0	★★★★/7.0	$99.00	408/727-8227	●/●	●	●	●	●	●	●[C]
DeltaPoint	QuickSite 1.0	★★/3.6	$99.95	408/648-4000	○/○	○	●	○	●	○	○
	EDITORS' CHOICE										
GoLive Systems	CyberStudio 1.0	★★★★/8.1	$349.00	415/463-1580	●/●	○	●	●	●	●	●
Microsoft	FrontPage 1.0	★★/4.8	$149.00	206/882-8080	●/●	●	●	○	●	●	●
NetObjects	Fusion 1.0	★★★★/7.1	$695.00	415/482-3200	●/●	○	●	○	●	○	●
Netscape Communications	Communicator 4.0	not shipping	$59.00	415/937-2555	○/●	●	●	●	●	●	○
NewSoft	Presto Personal Page 2.5	★★★/5.4	$49.99	510/445-8600	●/●	○	●	●	●	○	○
SoftQuad	HoTMetaL Pro 3.0	★★/4.2	$159.00	416/544-9000	●/●	●	●	●	●	●	●
Symantec	Visual Page 1.0	★★★★/7.2	$99.95	541/334-6054	○/●	○	●	●	●	●	●

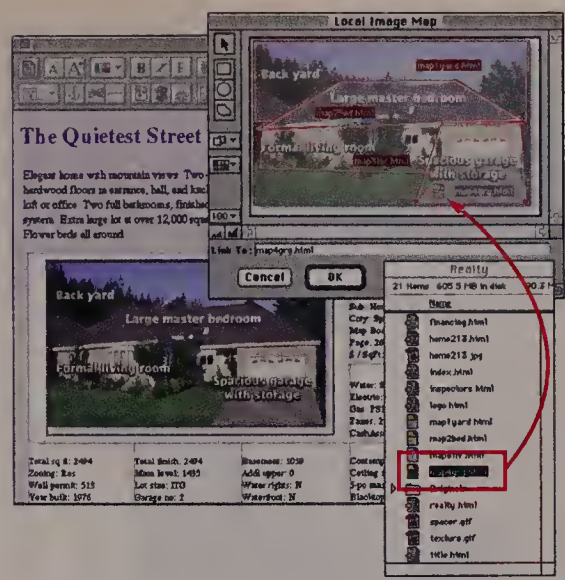
● = yes; ○ = no. [A] Based on features, implementation, innovation, performance, reliability, ease of use, and value. (See Star Ratings section for full explanation.) [B] Can't preview element (have to confirm inside brow

make the linking process more of a burden than it should be.

Globetrotter requires you to link to HTML files on your hard drive using an unlabeled, undocumented button. (I wouldn't even have figured out what the button does if I hadn't clicked on it by accident.) FrontPage has to launch an auxiliary application to permit you to so much as browse for a local page. Fusion presents you with known pages in your site but makes you enter the URLs for all other pages, including local ones.

But for sheer image-mapping drudgery, you need look no further than HoTMetaL Pro 3.0 from SoftQuad (*www.softquad.com*). By way of background, HoTMetaL is essentially a glorified HTML code editor that shows your text and graphics surrounded by coded tags (**body**, **img**, and so on). The view isn't at all representative of what the finished page will look like, and the HTML tags are every bit as technical as they are in a text editor, just more difficult to edit.

Consider this: after you draw a hot spot in an image, HoTMetaL asks you to manually enter the URL for the page, whether remote or local. When you finish, the program presents you with the option of naming the client-side and server-side map data. Select wisely, because if you change your mind later and decide



Easy Link to an Image Like PageMill and Home Page, Symantec's Visual Page lets you create links by dragging HTML files from the Finder and dropping them onto a page element. Here, I'm dragging a file directly onto a hot spot in an image map.

you don't need, say, the server-side information, there's no convenient way to delete it. You can see the tags on screen, but you can't remove them without passing through three dialog boxes. I would prefer to work in a text editor over this.

The Easiest Maps of All FrontPage, Fusion, Globetrotter, and HoTMetaL would all benefit if they simply permitted you to drag and drop HTML files from the Finder, as you can in PageMill, Visual Page, and Home Page. With these programs you drag the page you want to target and drop it onto the hot spot in the image map (see the screen shot "Easy Link to an Image").

For image-map functionality, PageMill and Visual Page tie for top honors, because both allow you to draw free-form hot spots; in Home Page, the runner-up, your only options are rectangles and circles, which defeats much of the purpose behind image maps.

Partition Your Page into Frames

Frames divide a Web page into independent partitions. A framed page is made up of an HTML file that defines the frames—called a frame set—and additional HTML files that appear inside the frames. Each frame can scroll separately, and your visitor can even drag the borders to make a frame larger or smaller.

Frames are hardly essential ingredients in a Web site. (As I write this, my site doesn't have a single one.) But used in moderation—with no more than two or three frames per page—they're excellent navigation tools, permitting you to display sitewide buttons and page-specific information in the same window.

When Wizards Go Bad The seven

The best programs for building an effective personal or small-business Web site are not necessarily the ones that pack in the most features, but those that give you the best day-to-day functionality. The top picks are Home Page and CyberStudio for formatting text, PageMill and CyberStudio for creating and editing tables, PageMill and Visual Page for building client-side image maps, and PageMill for assembling frames.

		FRAMES	OTHER FEATURES					COMMENTS
Automatically Converts PICT/TIFF	Wraps Text around Graphics	Automated Frame Generation	Open and Edit HTML Pages	Embed QuickTime Movie/ AIFF Sound	Edit HTML Source Code in Program	Built-in Site Management	Upload Site to Remote Server	
●/○	●	●	●	●/○	●	○	○	Has a clear approach and first-rate previewing capabilities.
●/○	●[B]	○	○	○/○	○	●	●	Intriguing automated functions are marred by murky design and inadequate documentation.
●/○	●[B]	●[B]	●	●/○[B]	●	○	●	Has more features than PageMill, but preview lapses occur.
○/○	○	○	○	○/○	○	●	●	Automatically generates entire sites, but feature set is tiny.
●/○	●	●[B]	●	●/●	●	●	●	Superb interface and controls form near-perfect application.
●/●	●	●[B]	●	○/○	●	●	●	Has helpful automation but peculiar interface and exorbitant hardware requirements.
●/●	○	○	●[D]	●/●[B]	○	●	●	Pixel-level control aids designers, but interface has glitches.
[illegible]/○	●	○	●	○/○	○	○	●	Foremost browser software, but has minimal collection of editing capabilities.
[illegible]/○	●[B]	●	●	●/○[B]	○	○	○	Has modest collection of features with average implementation, but very easy to use.
●/○	●[B]	●[B]	●	○/○	○	○	○	Odd combination of HTML tags and image previews provides little meaningful feedback.
●/[illegible]	●	●	●	●/●	●	○	●	Resembles PageMill, but has less convenient access to key features.

[C] *Can't draw irregularly shaped hot spots.* [D] *Imports text and URLs but loses graphic links.*

WYSIWYG editors I tested that support frames fall into two camps: those that let you edit frame sets and preview their contents at the same time, and those that make you work blind and preview the results in a separate browser. The worst of the programs in the second camp is FrontPage, which makes you work blind while wearing a dunce cap.

With FrontPage, you have to create frames using a step-by-step wizard in FrontPage Editor. Granted, a wizard can be helpful if you're just learning a topic, but if you have any amount of experience it just slows you down. No matter what, a wizard should never be your *only* option.

After you complete the wizard, FrontPage Editor dumps you out and closes the file. If you decide to go back and edit the file later, you have to switch to a program called FrontPage Explorer, open the frame set, and enter the wizard once again. Now you see why it helps to wear a dunce cap—you can quickly settle into the spirit in which FrontPage was programmed.

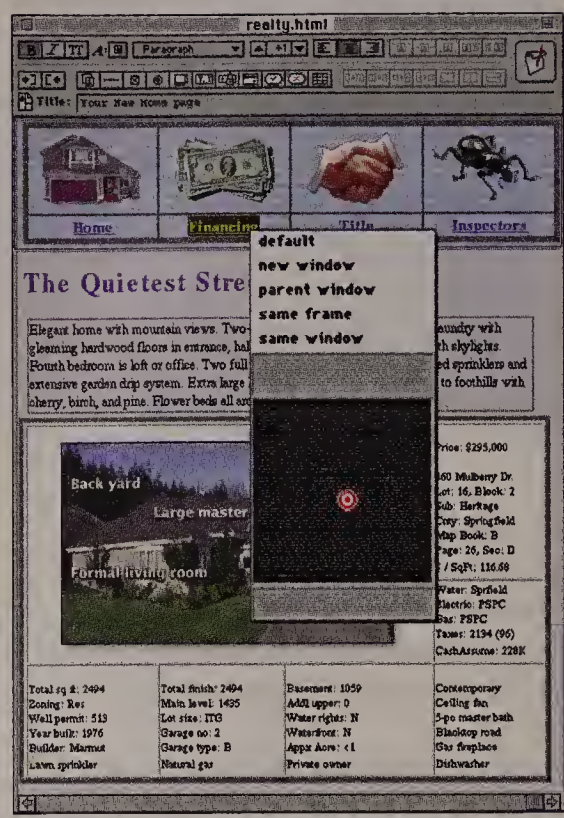
Seeing into Frames Oddly, only PageMill, Visual Page, and the otherwise underequipped Presto Personal Page let you modify frames while viewing their contents.

In Personal Page, you can create a frame as simply as dragging from a handle at the end of one of the scroll bars. Unfortunately, the program doesn't make it easy to import existing pages into the frame set. You have to target the page, specify which frame the page should appear in, and browse to the page using a hidden keyboard modifier.

Visual Page and PageMill let you drag pages into frames from the Finder. But once again, PageMill wins the convenience award. You can option-drag from the perimeter of the page to add and position a frame. Also, you can tell PageMill where to place a linked page by clicking on the hypertext (see the screen shot "Simplified Frame Setup"). Despite its relative age, PageMill continues to be a model for user-interface design.

Clumsy Windows Ports

Call me a home-team elitist, but the best Web-page editors are the ones that were born and bred on the Mac OS. Some programs in our WYSIWYG collection are clearly Windows ports with little if any thought given to making them subscribe to Macintosh conventions.



Simplified Frame Setup PageMill is the only program I tested that lets you specify where to place a linked page inside the frame set using an intuitive, graphical menu. Here, I clicked on the word *Financing* to tell PageMill to bring up the linked page in the central frame (the one with the house and table).

Fusion makes you control-click (the equivalent for right-clicking in Windows) to access functions found nowhere else inside the program. And the only way to close a file is to open another one or quit. (OK, that's not Windows-like; that's just plain dumb.) QuickSite won't let you open a file by double-clicking on it at the Finder level; you *have* to use the Open command. HoTMetaL litters your screen with four ribbon bars that you can't move or close without first converting them to floating palettes. And in typical Microsoft fashion, FrontPage ignores Macintosh drag and drop and does its best to install its own miniature operating system in your Extensions folder.

Macworld's Buying Advice

If you're looking for a page-authoring program under $150, your best bet is PageMill. Home Page and Visual Page provide a few extra features—both let you upload your site to an Internet service provider (see the sidebar "Publish Your Site"), for example—but PageMill offers significantly better previewing than Home Page, and it doesn't make you hunt for options inside dialog boxes the way Visual Page does.

Mind you, PageMill does offer its small share of frustrations—there are still plenty of times when I have to go running to the HTML source code to fix one of its messes—but no other program will let you churn out a small site more quickly.

If you have big goals for the future and you're willing to shell out some extra money now—about $200—then the best WYSIWYG editor at any price is CyberStudio. Although it takes a little extra time to set up a page in CyberStudio than in PageMill—you can't even start entering text until you set up a grid, for example—the program makes more sense as your site grows to a couple dozen pages or more.

CyberStudio combines expert positioning controls, first-rate site management, and high-end extras such as JavaScript syntax checking with an interface that's every bit as straightforward as PageMill's. CyberStudio's one drawback is that it doesn't let you preview frames. That's a big omission, but its strengths more than make up for it.

Much as I hate to beat the drum, I have to marvel at the fact that the Mac once again is the exclusive home to a piece of software that dominates its category. m

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Contributing editor DEKE McCLELLAND wrote *PageMill 2 for Dummies* (IDG Books Worldwide, 1997). He maintains his own site at *www.dekemc.com*. DORI SMITH provided technical assistance.

EDITORS' CHOICE

Personal Web Sites

★★★★/7.4 **Adobe PageMill 2.0** PageMill's streamlined interface takes excellent advantage of simple palettes and Macintosh drag and drop. **Company:** Adobe Systems (408/536-6000, *www.adobe.com*). **List price:** $149.

Small-Business Web Sites

★★★★/8.1 **GoLive CyberStudio 1.0** Though blessed with plenty of power and excellent precision controls, CyberStudio never makes you dig for its features. **Company:** GoLive Systems (415/463-1580, *www.golive.com*). **List price:** $349.

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Publish Your Site

Three ways to deliver your pages

by Mel Beckman

YOU'VE BUILT YOUR WEB SITE—now you want to get it in front of an audience. Let's take a look at the pros and cons of three approaches.

Serve It In-House

Apple's Personal Web Sharing software—available for $19.95 (you can order it from *www.software.net/mac/internet.htm/*) and slated to be included in Mac OS 8—provides a new option for low-volume Web serving. If your audience is on your intranet (that is, if it is connected to the same local area network as your Macintosh), it doesn't need to go through the Internet to get to your site. Similar to Personal File Sharing, Personal Web Sharing runs in the background of your machine. (An application that is similar but less polished, the Microsoft Personal Web Server, is available free from *www.microsoft.com*.)

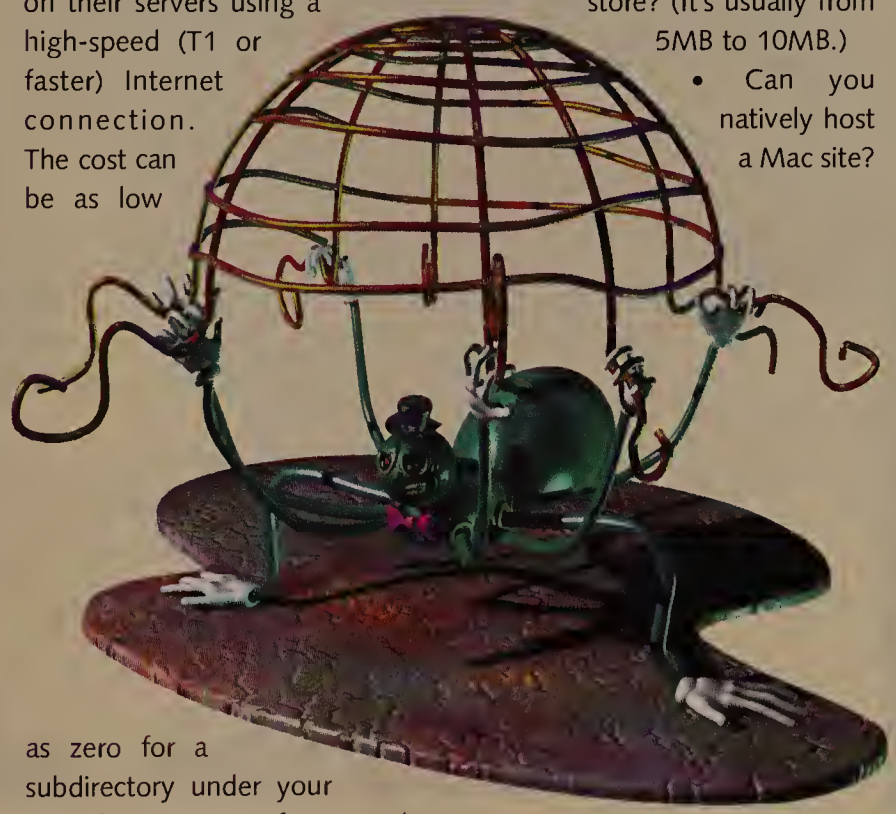
Using Personal Web Sharing is a snap: open the Web Sharing control panel, select a folder containing the HTML documents you want to publish, and they're instantly accessible to anyone with a Web browser.

An indexing feature lets you easily make lists of documents accessible to others. Alternatively, you can build a structured site using the Claris Home Page Lite WYSIWYG HTML editor, which is included. Although strictly a one-site server, Personal Web Sharing supports standard .cgi and .acgi Common Gateway Interface (CGI) files that let you add dynamic functionality to pages.

Use Your ISP

Probably the most convenient and least expensive option is to use your Internet or online service provider's resources and expertise.

Most ISPs and online services will remotely host your site on their servers using a high-speed (T1 or faster) Internet connection. The cost can be as low as zero for a subdirectory under your ISP's domain name (for example, *members.aol.com/johndoe*) to a high of $50 per month for a site with its own domain name (for example, *www.johndoe.com*), with a surcharge for traffic beyond a predefined threshold.



Unfortunately, not many providers have Macintosh hosts; consequently, your ability to use Mac-specific script and database capabilities is limited to those the ISP provides. Some HTML editors, such as Netscape and Claris Home Page, update information on your provider's site via a protocol called FTP. If your HTML editor doesn't have this feature, you must transfer your Web pages to the host site manually, using an FTP client such as Jim Matthews's $25 shareware Fetch (*fetch@dartmouth.edu*), which can be tedious.

Key questions to ask a prospective ISP are:

- How many megabytes can I store? (It's usually from 5MB to 10MB.)
- Can you natively host a Mac site?
- How many megabytes of traffic per month are included in the base price? (It's usually between 1GB and 5GB.)
- What is the speed of your upstream connection? (You want at least 1 Mbps.)

If you want a private domain name, ask if the ISP will register a name for you. This usually costs $150 to $200, plus an ISP usually charges more to serve a site with a private name. Alternatively, the name can be a subdomain within your company's existing domain name (for example, *janedoe.acme.com*).

Host a Public Site

You get the most control over your site with a dedicated server. Full-featured server software, such as StarNine Technologies' $795 WebStar (510/649-4949, *www.starnine.com*; see *Reviews*, April 1997), lets you construct a snazzy site that can sustain high traffic volumes (tens of thousands of hits per day). Also, you can use Mac-specific features and upload your Web content using Personal File Sharing, which is easier than FTP.

A server needs a dedicated Internet connection. Your office might have one, but many companies use special hardware and software, called firewalls, to prevent people on the Internet from accessing their networks. Also, if your site attracts lots of people, traffic could clog the connection.

An alternative is a separate dedicated connection just for Web serving, but it's expensive. Adequate bandwidth is key—don't even think of serving over a modem, even a 56-Kbps one, which is 56 Kbps for incoming traffic and 28.8 Kbps or less for outgoing. You need at least 64 Kbps—usually delivered via ISDN or frame-relay, which costs $300 to $500 per month—for Web serving.

The Last Word

If you simply want a home page for other users on your company's internal network, Apple's Personal Web Sharing is cheap, easy to set up, and runs on your desktop Mac.

If you want an Internet-visible site for yourself or your small business, having your ISP host your site avoids the hassle of running a server and saves the cost of a dedicated connection.

When you become Net-famous and really need the juice of a high-speed dedicated connection, a beefy Web server, such as WebStar, running on a speedy Power Mac will meet the demands of your fans. It will also strain your sanity and drain your energy. Do a lot of research, and know when you need to call a consultant.

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Storage to Go

Macworld LAB TEST

Add Some Zip to Your Life, or Really Jaz It Up

APS Technologies APS Jaz (left), Olympus Sys.230/SCSI (center), Iomega Zip

RECENTLY, I REALIZED THAT A LONG-TERM project of mine would eventually fill my hard drive many times over. So I researched my options for removable storage and bought a Jaz drive. What happened next I had not anticipated—I began backing up on a regular basis. I've usually backed up just a handful of current documents, knowing I could reinstall my System Folder and applications from their master disks. Suddenly I'm backing up everything, because it's so easy. I actually practice what I preach.

Sure, I could have bought a second hard drive; they're fast, reliable, big, and cheap enough to use for backup. But removables surpass conventional hard drives in some significant ways. If you carry data from place to place, for example, removable cartridges (and some drives, too) are easier to transport. While hard drives have finite capacities, you can always increase your removable-storage capacity for the price of additional media—as low as $10 per cartridge. And the cartridges are hot-pluggable; you can swap them the same way you swap floppies, unlike most hard drives.

But how do you choose among the bewildering array of media, mechanisms, vendors, and capacities? To help guide you toward your best option, Macworld Lab tested a wide cross section of current removable, random-access drives.

A Short Course in Removables

Like Gaul, the removable-drive domain can be divided into three parts: high-density floppy drives, rigid-platter drives, and optical drives.

High-Density Floppy Drives The only one in the Mac market today is the Zip drive, Iomega's (*www.iomega.com*) replacement for its now-discontinued Bernoulli. The Zip is also the most popular removable, and no wonder. The disks are small and cheap (around $17 for 94MB formatted capacity), and the drives are small (about the size of a modest paperback) and cheap at $149. And popularity breeds popularity: Zips are so commonplace that being able to exchange them with a Mac or PC user is almost a given. Add a trend

by Robert C. Eckhardt

Removable-Storage Drives à la Carte: Features and Prices Compared

Company	Product	Star Rating *	List Price	Phone	Mechanism
High-Density Floppy Drives					
Iomega	Zip	★★★/5.8	$149.00	801/778-1000	Iomega Zip 100
Removable Hard Drives					
	EDITORS' CHOICE				
APS Technologies	APS Jaz	★★★★/8.1	$499.95	816/483-1600	Iomega Jaz 1GB
	APS M540	★★★★/7.2	$299.95-$50 rebate	816/483-1600	Nomai MCD 540
ClubMac	1.0GB Jaz	★★★★/7.4	$499.00	714/768-8130	Iomega Jaz 1GB
DynaTek	RMD 1.0 ISD-G1/FWB	★★★★/7.5	$516.00	902/832-3000	Iomega Jaz 1GB
	EDITORS' CHOICE				
Iomega	Jaz	★★★★/8.3	$399.00	801/778-1000	Iomega Jaz 1GB
La Cie	1.0GB Jaz D2/Stol	★★★/6.6	$469.00	503/520-9000	Iomega Jaz 1GB
	540MB MCD D2/Stol	★★★/6.6	$249.00	503/520-9000	Nomai MCD 540
Nomai	Nomai 540	★★★/6.8	$299.00-$50 rebate	800/556-6624	Nomai MCD 540
ProDirect	PDI 5110	★★★/5.4	$399.00	612/941-1805	SyQuest SQ5110
	PDI 5200	★★★/6.2	$499.00	612/941-1805	SyQuest SQ5200C
StreamLogic	Hammer Jaz Solo 1000	★★★★/7.2	$589.00	818/701-8400	Iomega Jaz 1GB
SyQuest	EZFlyer 230	★★★/6.7	$199.00	510/226-4000	SyQuest EZFlyer EZ230S
	SyJet 1.5GB	★★★★/7.6	$499.00	510/226-4000	SyQuest SyJet-S
Optical Drives					
APS Technologies	APS 230 MO	★★★/5.5	$379.95	816/483-1600	Olympus Sys.230 MOS330
	APS 640 MO	★★★/6.4	$599.95	816/483-1600	Fujitsu DynaMO 640 M2513A
ClubMac	2.6GB Optical	★★★/6.8	$1699.00	714/768-8130	Maxoptix T4-2600
	EDITORS' CHOICE				
DynaTek	ROS 4.6 PSD-G2/FWB	★★★★/7.1	$2012.00	902/832-3000	Pinnacle Micro Apex 4.6GB
Fujitsu	DynaMO 640	★★★/5.9	$499.00	408/432-6333	Fujitsu DynaMO 640 M2513A
La Cie	640MB MO D2/Stol	★★★/5.7	$499.00	503/520-9000	Fujitsu DynaMO 640 M2513A
Maxoptix	640se	★★★/6.2	$685.00	510/353-9700	Maxoptix 640S
Micro Design International	SCSI Express 2600SME	★★★/6.6	$1995.00	407/677-8333	Maxoptix T4-2600
	EDITORS' CHOICE				
Olympus	PowerMO 2600/SCSI	★★★★/7.2	$1799.00	516/844-5000	Olympus Power MO 2600 MOS540
	Sys.230/SCSI	★★★/5.2	$359.00	800/347-4027	Olympus Sys.230 MOS330
Panasonic	PD	★★★/5.2	$499.95	800/742-8086	Matsushita PD-1 LF-1000
Pinnacle Micro	Apex 4.6GB	★★★/6.3	$1695.00	714/789-3000	Pinnacle Micro Apex 4.6GB
StreamLogic	HammerDisk 2600	★★★/6.8	$2509.00	818/701-8400	Olympus Power MO 2600 MOS540
	HammerDisk PE 640	★★★/5.6	$809.00	818/701-8400	Fujitsu DynaMO 640 M2513A

** Based on features, implementation, innovation, performance, reliability, ease of use, and value. (See Star Ratings section for full explanation.)* *** Calculated on the basis of cost for drive and ten media cartridges.*

toward incorporating internally mounted Zip drives as standard equipment on both Macs and PCs, and Zip disks might one day replace the 1.4MB floppy. By current standards the Zip's capacity is modest and its speed undistinguished, but where cost is a question, Zip is the answer.

Rigid-Platter Drives Essentially standard hard drive platters sealed in plastic, these are the fastest removables available. Iomega's old rival SyQuest (*www.syquest.com*) manufactures four of these mechanisms: the SQ5110 (83MB formatted) and SQ5200C (188MB), which use 5.25-inch cartridges, and the EZFlyer EZ230S (218MB) and SyJet-S (1.3GB), which use 3.5-inch cartridges. The Nomai (*www.nomai.com*) MCD 540 (513MB) and the Iomega Jaz 1GB (1019MB) also use 3.5-inch cartridges.

Optical Drives Close, rewritable cousins of the CD-ROM and CD-R, this relatively slow but especially stable medium has traditionally been the technology of choice where long shelf life (10, 20, or more years) is critical, and for maintaining vast archives.

Most use standard magneto-optical (MO) technology, some with pocket-size 3.5-inch cartridges, others with 5.25-inch, double-sided media (you have to flip them over to read the second side) housed in large cartridges. We also tested two LIM-DOW–compatible drives, which record to LIM-DOW media in one pass rather than the two passes standard MO requires: La Cie's (*www.lacie.com*) and StreamLogic's (*www.sledgehammer.com*) versions of the Fujitsu (*www.fujitsu.com*) DynaMO 640. Finally we tested one phase-change dual drive, Panasonic's (*www.panasonic.com/alive/*) version of the Matsushita PD-1 LF-1000 (632MB) mechanism, which uses a single-sided 5.25-inch cartridge and doubles as a CD-ROM drive.

Performance Tests

A couple of factors affect drive performance. One is write verification, a usually optional extra step in recording data, which increases data integrity but also slows data recording. Drives differ in whether the factory default for write verification is on or off; not all drives let you

(Price per Cartridge/Capacity/ Formatted Capacity/Price per MB)**	Included Software	Warranty (in years)	Comments
$17/100MB/94MB/$.34	Iomega Tools; DiskFit Direct	1	Best-selling removable is glacially slow but exceptionally cheap.
$100/1GB/1019MB/$.14	APS PowerTools 4	2	This third-party Jaz drive comes closest to matching Iomega's.
$60/540MB/513MB/$.17	APS PowerTools 4	2	Top-performing midcapacity removable hard drive is ideal for budget-watchers.
$100/1GB/1019MB/$.14	CharisMac Anubis; Iomega Tools	1	Speedy third-party Jaz drive is hobbled by poor documentation and missing refinements.
$100/1GB/1019MB/$.14	Hard Disk ToolKit PE	1	Middle-of-the-road Jaz drive is slower than most but reasonably priced.
$100/1GB/1019MB/$.14	Iomega Tools; DiskFit Direct	2	This is the Jaz drive to beat: good price, good warranty, good performance, good design.
$100/1GB/1019MB/$.14	La Cie Storage Utilities; Silverlining	1	Third-party Jaz drive crawls at barely half the speed of Iomega's own.
$60/540MB/513MB/$.17	La Cie Storage Utilities; Silverlining	1	Slowest midcapacity removable hard drive is no match for the APS M540.
$60/540MB/513MB/$.17	none	2	The lack of software, a power switch, and a standard SCSI ID selection mar this pocket-size drive.
$60/88MB/83MB/$1.08	Hard Disk ToolKit PE	1	Low-capacity drive offers dismal performance and nearly useless documentation.
$85/200MB/188MB/$.66	Hard Disk ToolKit PE	1	Has more capacity and better performance than the PDI 5110, but it's still no bargain.
$100/1GB/1019MB/$.14	Hard Disk ToolKit; HSM ToolKit	1	Highest-priced third-party Jaz offers only modest performance and a so-so warranty.
$30/230MB/218MB/$.16	Silverlining Lite; EasyLabels Lite; VirtualDisk Lite	1	The Zip's nearest competitor provides modest performance at a relatively low price.
$110/1.5GB/1.3GB/$.12	Silverlining Lite; EasyLabels Lite; VirtualDisk Lite	1	Highest-capacity removable hard drive is speedy but sensitive to SCSI-chain length.
$10/230MB/216MB/$.22	APS PowerTools 4	2	Drive offers better performance than the Sys.230/SCSI, but it's still no bargain.
$40/640MB/603MB/$.17	APS PowerTools 4	2	Best-performing medium-capacity MO is a good buy.
$98/2.6GB/2.4GB/$.13	CharisMac Anubis	2	Drive offers middle-of-the-road price, performance, and features.
$170/4.6GB/4.2GB/$.08	Hard Disk ToolKit PE	1	Slower than the Olympus Power MO 2600, but has twice the capacity at almost the same price.
$40/640MB/604MB/$.17	FormatterOne Pro; DataSaver	1	Has second-place speed for a medium-capacity MO, poor documentation, and few amenities.
$40/640MB/604MB/$.17	La Cie Storage Utilities; Silverlining	1	Poorest-performing medium-capacity MO is not a good buy.
$40/640MB/604MB/$.17	FormatterOne Pro	1	Comparably priced and almost as speedy as the APS 640 MO, this drive is a reasonable alternative.
$98/2.6GB/2.4GB/$.13	SCSI Express	1	Slowest drive in this size group also has the lowest price.
$98/2.6GB/2.4GB/$.13	FormatterOne Pro	2	The fastest optical drive we tested is well designed and reasonably priced.
$10/230MB/216MB/$.22	Sys.Works	2	Drive has low capacity and poor performance at a price that's no bargain.
$30/650MB/632MB/$.13	CorelSCSI Tools and Audio	1	Its ability to read CD-ROMs and play CDs doesn't offset this drive's notable slothfulness.
$170/4.6GB/4.2GB/$.08	Pinnacle Formatter	1	Space-age case fails to make up for this drive's surprisingly poor performance.
$98/2.6GB/2.4GB/$.13	Hard Disk ToolKit PE; HSM ToolKit	1	Drive has good performance, but few amenities and a very high price.
$40/640MB/603MB/$.17	Hard Disk ToolKit PE; HSM ToolKit	1	Highest-priced medium-capacity MO does not have performance to match.

change the factory setting (see the table, "Removable Drives à la Carte").

In Macworld Lab's tests, some drives showed a significant difference in performance between the two settings, others almost none. If you routinely keep two sets of backups, for example, write verification probably isn't important to you. If it is, buy a drive that still performs well with write verification turned on (see the benchmark, "Removable Drives: Storage on the Go").

Finally, installed drives, which run off the Mac's faster internal SCSI bus, run faster (and cheaper) than externals.

Conveniences—and Their Absence

With SCSI devices it's often the little things that can make your day or drive you nuts. Take case design. Iomega's Zip and Jaz, SyQuest's EZFlyer and SyJet, and Nomai's 540 are all compact enough to fit in a briefcase should you need to transport both drive and cartridges. Not so the Micro Design International *(www.mdi.com)* SCSI Express or Olympus *(www.olympusamerica.com/digital/)* PowerMO; the latter is about the size of a loaf of bread. Drive-meisters APS (*www.apstech.com*), ProDirect (*www.pdisales.com*), and La Cie box all their drives in a mid-size, color-coordinated, easily stacked, one-size-fits-all-mechanisms case. All the drives we tested except the StreamLogic, Maxoptix (*www.maxoptix.com*), and MDI drives can also sit vertically to conserve valuable desk space. SyJet, Zip, and Iomega Jaz drive cases have a convenient window so you can read the label on the disk inside.

Setup can be a hassle, too, especially if you disconnect and reconnect the drive often. Zip, SyJet, and Nomai 540 drives all lack power switches, so unless you plug them into a switchable outlet, they're always on. The Zip, Olympus 230/SCSI, and Nomai 540 drives have power adapters, which cover two outlets on a power strip, and the SyJet's transformer, which is partway along the power cable, either sits on the desk or dangles in midair.

Then there are SCSI IDs. Most of these drives have convenient push-button selectors. The Panasonic PD uses less-than-handy DIP switches for setting

the SCSI ID number, and the EZFlyer sets via software.

All the drives except the Nomai 540 come with a basic formatter utility, which is useful if you need to reformat a problem cartridge. Many vendors toss in simple backup software, disk-cataloging utilities (useful when you can't remember which cartridge holds a particular file), and helpful drive utilities (see "Removable Drives à la Carte").

Dollars and Sense

With removables, two variables figure in the cost equation. One is the initial investment—how much will you pay for the drive and the one included cartridge? Initial investment is highest ($1500 and up, street price) in the 2GB-and-up optical camp, lowest ($150) for the Zip drive, and an average of $400 to $500 for the best-performing removable hard drives.

But you also have to consider overall cost per megabyte—the total cost of the drive and cartridges (and those cartridges do tend to accumulate) divided by the resulting total storage capacity. Per-megabyte costs range widely: rock bottom (8 to 22 cents) for high-capacity optical media all the way to $1.08 for SQ5200 media.

Decision Guide for the Perplexed

If the ins and outs of performance, price, conveniences, and shortcomings have got you stumped, join the crowd. Choosing a removable is not as easy as choosing a hard drive. Ask yourself these questions before you commit.

Do you run an open shop? If you will be trading removable media with others (a colleague or a print service bureau), the type of removable device they use will dictate what you need to buy.

Do you have a substantial investment in older, lower-capacity media? Rather than simply writing off that investment,

Macworld LAB TEST

Removable Drives: Storage on the Go

Removable hard drives using Jaz, SyJet, and Nomai MCD mechanisms are the speediest available—the best are as much as three times faster than the slowest drives in the roundup. Meanwhile, optical drives, never known for speed, are getting faster. The best still perform at only two-thirds the speed of the fastest hard drive removables, but current-generation opticals give the slower, smaller-capacity removables a serious run for the money. The highest-capacity mechanisms generally outperform their smaller (and usually older) relatives. Clearly price, not speed, is the primary factor behind the Zip drive's success. The Zip chugs along at a little more than one-third the speed of the Iomega Jaz drive, so you know no one buys it because it's zippy.

Best result in test. Drives are listed in order of performance, best to worst. All times are in seconds. Shorter bars are better.

	Write-Verify	Overall Score	FileMaker Search/Sort	Open Photoshop File	Save Photoshop File	Copy to Drive	Copy from Drive	Duplicate Files
Iomega Jaz	Off	1.00	44.7	26.1	21.6	10.5	10.6	13.4
ClubMac 1.0GB Jaz	Off	0.91	42.9	28.2	25.7	14.5	10.3	18.6
StreamLogic Hammer Jaz Solo 1000	Off [A]	0.89	42.9	28.8	26.0	14.7	10.7	19.3
APS Technologies APS Jaz	Off [A]	0.89	42.9	28.8	25.9	14.8	10.6	19.3
SyQuest SyJet 1.5GB	Off	0.88	52.8	24.0	26.3	12.2	10.8	16.6
DynaTek RMD 1.0 ISD-G1/FWB	On (fixed)	0.88	44.2	29.0	26.3	14.9	10.6	19.5
APS Technologies APS M540	Off [A]	0.87	57.7	24.8	25.0	10.3	11.2	17.2
Nomai 540	Off (fixed)	0.85	52.0	28.8	24.2	12.8	11.1	18.7
SyQuest EZFlyer 230	On (fixed)	0.72	76.9	26.5	31.3	12.5	14.0	18.4
Olympus PowerMO 2600/SCSI	On (fixed)	0.68	55.4	43.0	46.4	18.6	12.6	27.0
StreamLogic HammerDisk 2600	Off [A]	0.67	54.1	42.2	46.5	22.5	12.3	26.1
La Cie 540MB MCD D2/Stol	Off (fixed)	0.65	107.7	28.7	26.4	13.4	13.0	21.7
Pro Direct PDI 5200	Off [A,B]	0.61	71.9	37.4	40.4	17.9	15.8	24.2
DynaTek ROS 4.6 PSD-G2/FWB	On (fixed)	0.59	72.4	65.0	55.0	20.6	10.7	34.3
ClubMac 2.6GB Optical	Off	0.57	67.1	68.4	49.5	27.9	11.8	33.4
La Cie 1.0GB Jaz D2/Stol	Off (fixed)	0.52	51.8	109.4	54.3	14.8	54.3	58.8
MDI SCSI Express 2600SME	On [A,C]	0.52	69.6	113.3	56.5	32.9	12.2	41.8
APS Technologies APS 640 MO	Off [A,B]	0.49	107.0	67.9	38.8	22.3	14.8	33.2
StreamLogic HammerDiskPE 640 (LIMDOW)	Off [A]	0.47	100.9	21.8	43.2	24.9	27.9	44.1
Maxoptix 640se	On (fixed)	0.47	85.9	110.0	68.4	38.8	12.5	38.3
Fujitsu DynaMO 640	On (fixed)	0.46	86.3	110.1	68.2	38.8	12.7	38.5
Pro Direct PDI 5110	Off [A,B]	0.46	72.6	63.8	60.4	26.8	24.3	44.0
Pinnacle Micro Apex 4.6GB	Off [A,B]	0.43	82.5	28.3	77.5	56.8	20.9	57.7
APS Technologies APS 230 MO	Off [A]	0.42	81.7	71.8	68.4	37.1	19.4	43.9
La Cie 640MB MO D2/Stol (LIMDOW)	On (fixed)	0.42	99.8	91.5	65.0	33.2	17.2	42.0
StreamLogic HammerDiskPE 640	Off [A]	0.40	100.9	84.7	69.5	34.9	27.9	52.7
Iomega Zip	Off [A,B]	0.40	139.3	49.9	56.1	22.4	21.7	37.3
La Cie 640MB MO D2/Stol	On (fixed)	0.38	99.5	120.6	80.2	45.8	17.3	53.3
Panasonic PD	Off	0.34	98.4	91.1	85.5	46.3	22.3	69.2
Olympus Sys.230/SCSI	On (fixed)	0.34	113.7	89.5	94.6	51.2	18.8	59.7

[A] Default setting. [B] Noticeable speed degradation with write-verify turned on. [C] Disabling write-verify caused a bus error.

Behind Our Tests

Macworld Lab tested removable-media drives using our standard suite of business and graphics applications. To show access speed, we performed two finds and two sorts of a 9054-record Claris FileMaker database for an unindexed value. For an indication of data throughput, we opened and saved a 20MB file in Adobe Photoshop. To determine general performance, we duplicated two files totaling 34.7MB in the Finder, and copied the files to and from each drive. All drives were tested with write-verify turned off, except where noted (some do not permit switching). Where applicable, drives were also tested with write-verify switched on (not shown here). Tests were conducted using a Power Macintosh 7500/100 with 32MB of RAM, a 256K L2 cache, and Mac OS 7.6.—**Macworld Lab testing supervised by Jeff Sacilotto**

Plug-and-play is not the phrase that came to mind when we attempted to get many of these removable drives up and running. For one thing, the documentation is frequently unhelpful and sometimes missing altogether. Worse, there's the eternal SCSI cabling-and-connectors conundrum. To permit daisy-chaining, most vendors equip their drives with two SCSI connectors, but not all connections are alike.The APS Jaz (A) features two 50-pin connectors, for example, whereas the Iomega Zip (D) has two 25-pin sockets. La Cie's MCD optical drive (B) gives you a choice—one 50-pin and one 25-pin, but the Nomai 540 (C) has only the one 25-pin plug, which relegates it to the end of the chain. The Iomega Jaz (E) comes with two Fast SCSI 2 sockets. (Note that unless your Mac is equipped with a SCSI 2 card, your Jaz won't get the added speed.)

Before you buy, be sure to see what kind of cable you need, whether it requires an adapter or terminator—and whether these are included in the price of your drive. Also, some devices are sensitive to the length of the SCSI chain. SyQuest warns against using the SyJet in chains longer than 9 feet, a shortcoming we've confirmed (see *Reviews, Macworld*, May 1997).

it may make sense to buy a drive that's compatible with your existing cartridges. The Nomai 540 reads and writes to 3.5-inch 270MB SyQuest cartridges, for example, and the EZFlyer can also handle EZ135 cartridges. Many MO drives are also backward-compatible; the La Cie 640MB optical, for example, reads 128MB cartridges and can read and write to 230MB and 540MB cartridges.

Are your storage needs really substantial? If your storage needs are immense, optical drives are the most practical decision.

Is shelf life a major factor? If data integrity and long shelf life are paramount, again, the optical drive that best fits your budget is the best choice.

Will you use the drive as a primary storage device? Then you need speed and should choose one of the top-performing Jaz drives or a SyJet.

How much can you spend? Frugal folk with modest storage needs should buy a Zip drive (there's nothing cheaper or more ubiquitous) or the much faster and only slightly more expensive APS M540 drive.

Macworld's Buying Advice

Except for special cases, the best choices for a removable drive fall into two groups. Where data longevity is of primary concern, the best choices are the Olympus PowerMO 2600/SCSI or the DynaTek *(www.dynatek.ca)* ROS 4.6 PSD-G2/FWB. Although the Olympus's formatted capacity is slightly smaller than that of related drives, its reasonable price ($1799), top-rated performance, convenient design, and two-year warranty make it an excellent buy. The $2012 DynaTek is slower and carries just a one-year warranty, but it offers more than double the storage capacity per cartridge and a rock-bottom per-megabyte cost.

Where performance is paramount, the clear winners are the Jaz and SyJet mechanisms. The SyJet's higher capacity is attractive, but a few design flaws and sensitivity to long SCSI chains mean it doesn't earn our unequivocal recommendation. The Iomega and APS Jaz drives, on the other hand, turned in excellent performance stats, and both are well designed and have a two-year warranty.

Removables are the best solution for moving big chunks of data short distances, for cheap and easy backup, for infinitely expandable storage, for archiving little-used files, and for storing data that needs to be locked up when not in use. In fact, removables are rapidly becoming a standard fixture in computing. If you don't have one, you should. m

Contributing editor ROBERT C. ECKHARDT uses his old 44MB SyQuest cartridges as bookends.

EDITORS' CHOICE

Optical Drive

★★★★/7.2 **PowerMO 2600/SCSI** The fastest optical drive we tested combines good design, a reasonable price, and a two-year warranty. **Company:** Olympus (516/844-5000, *www.olympusamerica.com/digital*). **List price:** $1799.

★★★★/7.1 **ROS 4.6 PSD-G2/FWB** Although slower than the Olympus PowerMO 2600, this drive offers double the capacity at almost the same price. **Company:** DynaTek (902/832-3000, *www.dynatek.ca*). **List price:** $2012.

Removable Hard Drive

★★★★/8.3 **Jaz** With its excellent price, warranty, performance, and design, Iomega's Jaz drive is still the one to beat. Company: Iomega (801/778-1000, *www.iomega.com*). **List price:** $399.

★★★★/8.1 **APS Jaz** This Jaz drive comes closest to matching Iomega's features and performance and is more easily stackable with standard hard drives. **Company:** APS Technologies (816/483-1600, *www.apstech.com*). **List price:** $499.95.

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Connect

JEFFREY PELO

Your Workgroup

What you need to know to set up a small Ethernet network by Mel Beckman and Elizabeth Dougherty

IF YOU'RE LIKE many Macintosh users these days, your computer count is growing, especially if you're in a small business. There's the Main Mac, your 200MHz PowerPC pride and joy (strictly for work, of course); your partner's Main Mac 2; the Auxiliary Mac for the occasional temp; plus a PowerBook or two; and you're contemplating a Web server.

You can save time and money by connecting this collection, along with your peripherals, with an Ethernet network, which will let you easily share files and resources such as printers and an Internet connection. You might think a local area network (LAN) is only for big companies, but you can reap the advantages, too, if you're willing to spend a little time and money.

While the Mac's built-in LocalTalk connection makes it easy to connect devices, its 230.4-Kbps (0.23-Mbps) transmission speed pales next to Ethernet's 10 Mbps (or even 100 Mbps, if you want to invest the funds). Both the cost and the complexity of putting together an Ethernet network have been reduced so much that the benefits far outweigh the short-term expense.

In this hands-on guide, you learn what you need to construct your own Ethernet network: the parts, how they interrelate, how to avoid problems, and how much it costs. You can put together an Ethernet network for a handful of machines for under $100. For most people, the 10BaseT type of Ethernet is the best to use, since it's easy to install and troubleshoot and uses the most prevalent wiring type.

With this article in hand, you will be able to sort through the dizzying array of network equipment (see the sidebar, "Picturing Your Equipment Options") in catalogs and computer stores and zero in on exactly what you need to start enjoying the benefits of being connected.

First, the Mac Connection

To attach a device to an Ethernet network, the device needs an Ethernet connector—either built in or via add-on hardware—into which you can plug the network cable. Here's what you need to know about the different kinds of connectors (to see what these look like, see the diagram "First, Determine the Right Connection").

Built-in 10BaseT If you bought your Mac in 1995 or later, it may have Ethernet built in, in the form of a 10BaseT connector, which looks like an overgrown telephone jack (it has eight conductors instead of four). This is the best kind of connection because it connects directly to a 10BaseT cable without any extra hardware.

Built-in AAUI Many Macs, especially older ones, have a connector type called AAUI (Apple Attachment Unit Interface). This requires a hardware adapter called a 10BaseT transceiver (about $35), a tiny box with a 10BaseT connector for the network cable and its own cable that connects to the Mac's AAUI port. You don't need any additional software.

Add-on Card If your Mac doesn't have a 10BaseT or AAUI connector but has an expansion slot, you can add a 10BaseT connector via an internal card. Ethernet cards come in several varieties, including NuBus, PCI, Apple Communications Slot, PC Card, and LC (for the PDS slot).

You install the card just as you would any add-on card: following the instructions included with the card, you open your Mac, locate the card slot, insert the card, and button everything back up. Unlike the way it is in the PC world, there are no jumpers or switches to set on Mac cards—just plug and play.

Cards might require you to install driver software—read the documentation for requirements and check the vendor's Web site for the latest version.

Ethernet cards are commodities, costing as little as $70 (see the table, "Comparison Shopping for Your Ethernet Network"). Buy your cards from a reputable manufacturer—such as Asanté Technologies, Dayna Communications, or Farallon Communications—that offers a warranty and good technical support.

External SCSI Adapter For Macs without expansion slots, such as older PowerBooks, or when expansion slots are already filled, you need an external SCSI 10BaseT Ethernet adapter. The vendor will include any software you need. SCSI Ethernet adapters are expensive, around $200.

Second, the Right Cable

Whatever type of connector you have—a port in the back of your Mac, a transceiver, an add-on card, or a SCSI adapter—the goal is to get a place to plug in a 10BaseT cable, also called unshielded twisted-pair (UTP).

You may hear about thick and thin Ethernet; avoid these obsolete technologies.

Here's what you need to know about buying cable.

Speed Rating You want Category 5 cabling, the fastest possible (the scale is 1 to 5). The price difference between categories is not large, so don't consider buying anything less than Category 5. Look for the *Category 5* or *CAT-5* designation printed every few feet on the wiring's outer insulation. Another benefit to using Category 5 cable is that it will accommodate faster network speeds, including 100-Mbps Ethernet.

Length Measure your work area, and buy terminated cable lengths that match the distances between devices as closely as possible. Keep in mind that Ethernet has distance limitations—practically, a maximum of 90 meters (about 300 feet).

Straight Through versus Crossover 10BaseT cables come wired straight through or crossover. You'll usually use straight-through cable; crossover cables are for special cases, such as connecting two devices directly.

To distinguish between types, hold the transparent connectors from both ends of the cable side by side with the same orientation. In a straight-through cable, wire colors inside the connectors match left to right; in a crossover cable, the color sequence differs.

Third, the Hub

In a 10BaseT network, you connect one end of the cable to the device and the other end into a hardware piece called a hub (also called a repeater). Just as the hub of a wheel connects all the spokes, a network hub connects all the devices of the LAN in what's called a star topology. In contrast, LocalTalk devices link sequentially, in a daisy chain.

The hub adds some expense (about $100 for eight ports) but connects multiple devices, regenerates data signals to improve reliability, and simplifies troubleshooting by isolating a failing device to prevent the whole network from crashing.

Here's what you need to know about buying a hub.

Choose Unmanaged Of the two kinds of hubs—unmanaged and managed—you want unmanaged; managed hubs are expensive and have remote-control capabilities you don't need in a small LAN. Count the devices you want on your network and add two for growth—that's the minimum number of ports you need.

Common 10BaseT small-hub configurations have five or eight ports. There's not a big price difference, so don't scrimp—networks usually grow rather than shrink. Expect to pay between $10 and $20 per port. Make sure you count *10BaseT* ports; one port is sometimes for connecting another hub or different cabling type.

Decipher the Lights You'll want to know a little bit about troubleshooting, but the information that hubs provide can make it as easy as it is to check Print Monitor when you have a printing problem.

Every hub has status lights indicating whether a port is connected properly and when data is moving to the port. Other lights show if there's too much traffic or a failed device.

I find it easiest to monitor a hub that has the connectors and status lights on the same side of the box. However, you might want to have the cables on the back of the hub so they're out of the way. Just make sure you can easily see the lights to check for trouble.

As with cards and cabling, buy a hub from a reputable manufacturer that stands behind its warranty with good technical support. Online resources are key for getting quick help, so check out a vendor's Web site for online documentation, tutorials, and troubleshooting aids.

Bridge to LocalTalk If you have LocalTalk devices, such as printers, that don't have an Ethernet connection, you can use a LocalTalk-to-Ethernet converter (some are just for printers), costing $200 to $300.

If you need to connect to LocalTalk Macs, you need a device called a bridge. However, a bridge is expensive, about $500 to $800. You can also use Apple's free LaserWriter Bridge (available at *www.macworld.com/software*) or $79 LocalTalk Bridge software to turn a Mac into a LocalTalk converter or bridge, respectively. Remember that LocalTalk devices connected to an Ethernet network this way are still limited to LocalTalk's slow speed.

A Hubless Alternative

If you're converting an existing LocalTalk network to Ethernet, or if centralized hub wiring is inconvenient, you might consider Farallon's hubless 10BaseT architecture called EtherWave, which uses 10BaseT cabling and proprietary adapter cards and transceivers (each with two 10BaseT jacks). EtherWave lets you daisy-chain up to eight devices LocalTalk-style.

EtherWave transceivers and adapter cards cost about

Comparison Shopping for Your Ethernet Network

Company	Phone	Web Address	10BaseT Cards						
			PCI	NuBus	LC	CommSlot	CommSlot II	PC Card	Other Form Factors
Apple Computer	408/996-1010	*www.apple.com*	$140	○	$99	$99	$99	○	○
Asanté Technologies	408/435-8401	*www.asante.com*	$82	$99	$83	$70	○	$159	IIsi, $190; SE/30, $149; SE, $15
Dayna Communications	801/269-7200	*www.dayna.com*	$75	$104	$99	$67	$105	$119 [C]	IIsi-SE, SE/30, or SE, $145
Farallon Communications	510/814-5000	*www.farallon.com*							
EtherMac product line			$79	$99	$82	$73	○	$129 [C, D]	PowerBook 1400, $119; SE/30-IIsi or SE, $159
EtherWave product line			$109	$159	$159	$99	○	$185 [D]	○
Focus Enhancements	508/371-2000	*www.focusinfo.com*	$69	$79	$69	○	○	○	PowerBook 1400, $129
Kingston Technology	714/435-2600	*www.kingston.com*	$75	○	○	○	○	$119	○
Sonic Systems	408/736-1900	*www.sonicsys.com*	$85	$79	$79	$75	$85	$119	○

○ = none. All prices are company's estimated prices. [A] $79 software. [B] Printers only. [C] $349 with 33.6-Kbps modem. [D] For a PowerBook.

twice as much as their hub counterparts. If you have AAUI-equipped Macs and need to buy transceivers anyway, the extra cost for EtherWave transceivers may be offset by the money you save not buying a hub. If you have some AAUI-equipped Macs, you can use EtherWave for those, but you'll still need a hub for Macs with only 10BaseT connectors. You can connect an EtherWave daisy chain to a 10BaseT hub.

Do the math. Generally, a hub is the cheaper option for Macs with 10BaseT built in, since two EtherWave transceivers cost more than a hub and two transceivers.

The Software Side

As long as you've installed any required drivers for adapter cards, System 7.5 and above has all the software you need for common networking tasks.

Transport Protocols The Mac OS includes transport protocols, the software needed to move data over a network. The protocols you care about are AppleTalk and TCP/IP (which the Internet uses).

You should use Apple's current network architecture, called Open Transport (version 1.1.2 at this writing), which installs automatically with System 7.5 and is mandatory with System 7.6. Under System 7.5, you may have to enable Open Transport by running the Network Software Selector, found in the Apple Extras folder. (Apple has announced that it will maintain but not further develop Open Transport; instead it will use the OpenStep networking architecture in the new Rhapsody OS expected in mid-1998. However, that's not something to worry about right now.)

File Sharing The Mac OS includes Personal File Sharing, which lets network users share data on hard drives in what's called peer-to-peer networking. For centralized file sharing, AppleShare server software, an extra-cost item, is necessary. You likely won't need AppleShare to accommodate data-sharing needs on a small LAN.

Connect and Test

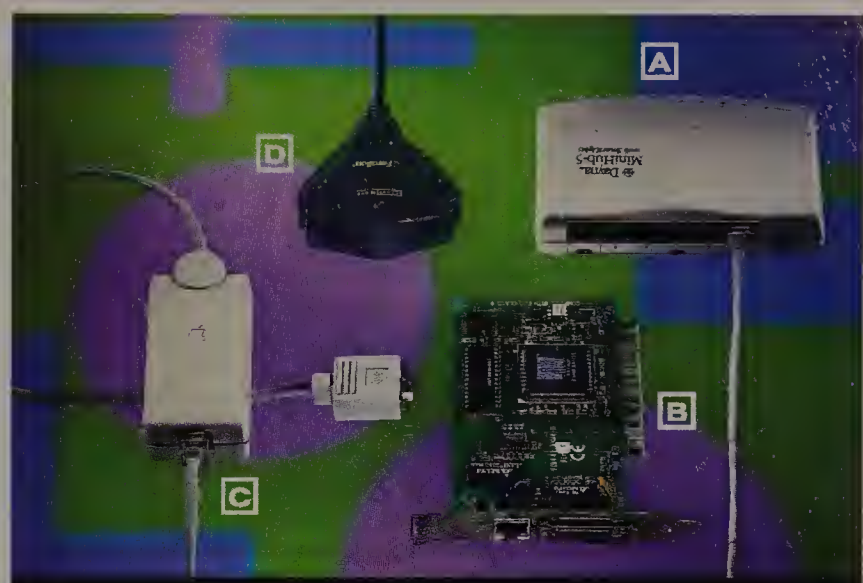
Once you've connected all the hardware together, take the time to make sure every device can communicate with every other device and measure network throughput by timing how long it takes to copy files between Macs using Personal File Sharing.

Keep in mind that although 10BaseT theoretically transfers data at 10 Mbps, due to overhead you can only achieve about 60 percent of this speed. Data rates of 6 Mbps (750 KBps) are very good on fast Macs, and 4 Mbps (500 KBps) may be perfectly acceptable. Keep a record of your baseline network performance so you'll have a comparison point if you have trouble later.

The symptoms of problems can be as obvious as a nonfunctional network or as subtle as reduced performance or intermittent failures. Most protocols that run over Ethernet have built-in error detection and correction, and they will forge on in the face of severe transmission problems.

Make a Diagnosis The status lights on the hub, adapter cards, and transceivers will help you diagnose a problem if trouble occurs.

- The link status light indicates that there's a proper electrical connection between a device and the hub in a hub-based network or between two devices in a hubless network. If this light is off, try replacing the cable; make sure you have the right type (straight through or crossover).
- The traffic light, sometimes labeled Activity or LAN, blinks when traffic is flowing. Better-quality devices have separate transmit and receive indicators (called TX and RX,



Picturing Your Equipment Options

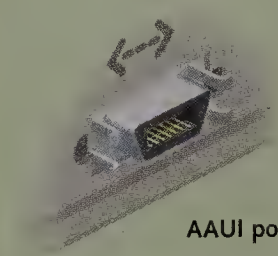
[A] A **HUB**, such as Dayna's MiniHub-5, serves as a central connection point for devices on a 10BaseT network. The lights give you information such as whether a port is connected properly and when data is moving to the port. ••• You use 10BaseT cable to connect your Mac to the hub. If your Mac doesn't have a built-in 10BaseT connector, you can add one using hardware such as [B] an **ADD-ON CARD**, like Asanté's PCI card, or [C] an **AAUI TRANSCEIVER**. ••• [D] Farallon's **ETHERWAVE**, a hubless alternative, uses 10BaseT cabling and proprietary adapter cards and transceivers (each with two 10BaseT jacks, pictured). EtherWave lets you daisy-chain up to eight devices.

AAUI Transceivers	SCSI-to-Ethernet Adapter		LocalTalk-to-Ethernet Adapters	Hubs
	Desktop	PowerBook	Number of Devices/Price	Number of 10BaseT Ports/Price
$79	○	○	A	5/$149
$32	$179	$227	1B/$249; 3B/$279	5/$55; 8/$60
$35	$230	$325	2/$250; 8/$285	5/$67; 8/$99
$29	○	○	1D/$199; 1B/$229; 8B/$289	5/$75; 8/$95
$89	○	○	1D/$239; 1B/$289; 8B/$339	○
$27	○	○	○	4/$90; 8/$119
$59	○	○	○	5/$99; 8/$119
$31	$175	$199	2/$229; 12/$299 or $399	5/$128; 8/$152

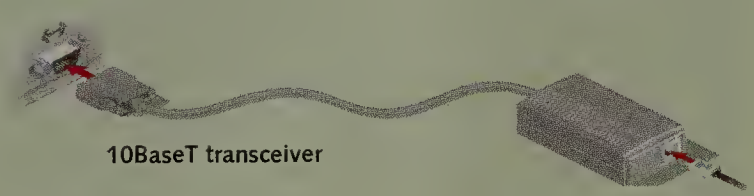
First, Determine the Right Connection

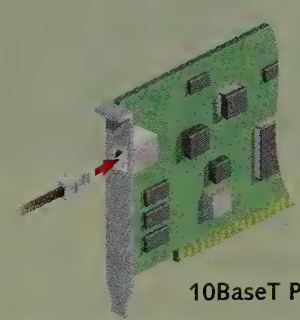
Whether you have a built-in port or need extra hardware—a transceiver or a card—to connect to a 10BaseT Ethernet network depends on the vintage of your Mac. Tip: to see if your Mac has a 10BaseT or AAUI port, look for the Ethernet connector symbol <--->. Here's what the three options look like.

Built-in Ethernet If your computer has a 10BaseT (also called RJ-45) port, you're ready to go—all you need is a 10BaseT cable.



AAUI Connection If your computer has an AAUI port, you need a 10BaseT transceiver, a tiny box with a 10BaseT connector and a cable that connects to the AAUI port. You can use either a standard transceiver or Farallon's EtherWave transceiver.



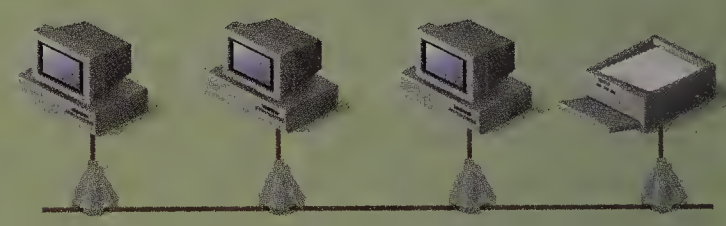


Add-in Card Required If your computer has no network port, you need add-on hardware, usually an internal adapter card like the PCI card shown here.

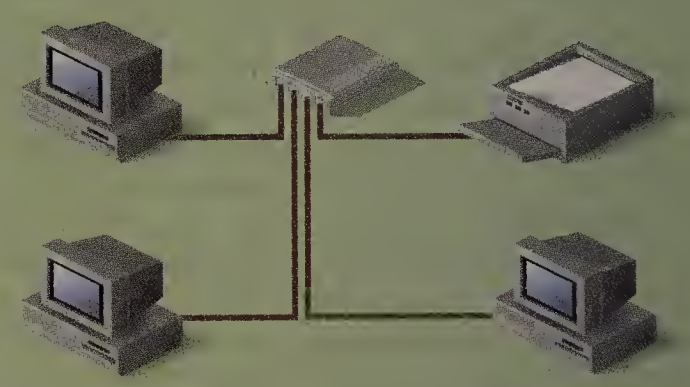
Next, Pick the Best Configuration

How you configure your network depends mainly on how many devices you have (and how many you plan to add) as well as their location.

The Simplest Network Connecting two Macs, or a Mac and a peripheral such as a printer, requires a single crossover cable.



The Daisy-Chain Option With Farallon's EtherWave, devices connect one to another in a daisy chain, rather than to a hub.



Hub-Centric Approach A 10BaseT hub connects more than two devices in a star topology. Use straight-through cables.

respectively) to indicate the traffic direction. If you have a link indication but no traffic indications, suspect software misconfiguration or a failed hub, transceiver, or adapter card. Try swapping cables, then changing ports on the hub, to isolate the problem.

• The collision light blinks when there's too much traffic for the LAN to handle. A few collisions per minute are normal—these result when two computers try to transmit at the same time. Frequent (every few seconds) or continuous collisions may indicate wiring problems, such as damaged cables or corroded connectors. Try simplifying your network configuration to just two devices and the hub to isolate the problem component.

• The jabber light indicates that a device is transmitting noise onto the network. Jabber occurs when a device malfunctions and usually indicates that the device's Ethernet transceiver or card has failed. You can manually locate the failing device by disconnecting ports one at a time at the hub. When the jabber light goes out after you disconnect a particular port, you've identified the problem.

Wire Tangles Most Ethernet problems result from bad or improperly wired cables. Buying ready-made cables designed for 10BaseT helps prevent problems. Still, you should have spare Category 5 cables for testing suspected wiring problems. Bad cable routing can induce noise in an Ethernet cable. Avoid routing cables in parallel with AC power lines, device power cables, or RS-232 printer cables.

Although you're not likely to reach 10BaseT's length limitations in a small office or home, it's easy to forget that 90-meter limit between hub and device. You can extend this limit by connecting up to three hubs in a series (follow manufacturer instructions for interconnecting hubs).

Macworld's Buying Advice

To take all the decision making out of network setup, consider buying a preassembled kit. For example, Dayna's Network Starter Kit provides everything you need for plug-and-play 10BaseT Ethernet: an eight-port hub, three PCI cards, three 50-foot Category 5 cables, and a step-by-step guide. At $289, this kit trims about $160 from the cost of separate components. However, the 50-foot cables are too long for most applications; ignore them and buy cables the right length for your space.

With its higher performance and low cost, Ethernet is a better choice than LocalTalk for small networks. Using quality components and avoiding common wiring errors are the secret to building a reliable LAN and enjoying the benefits of being well connected. **m**

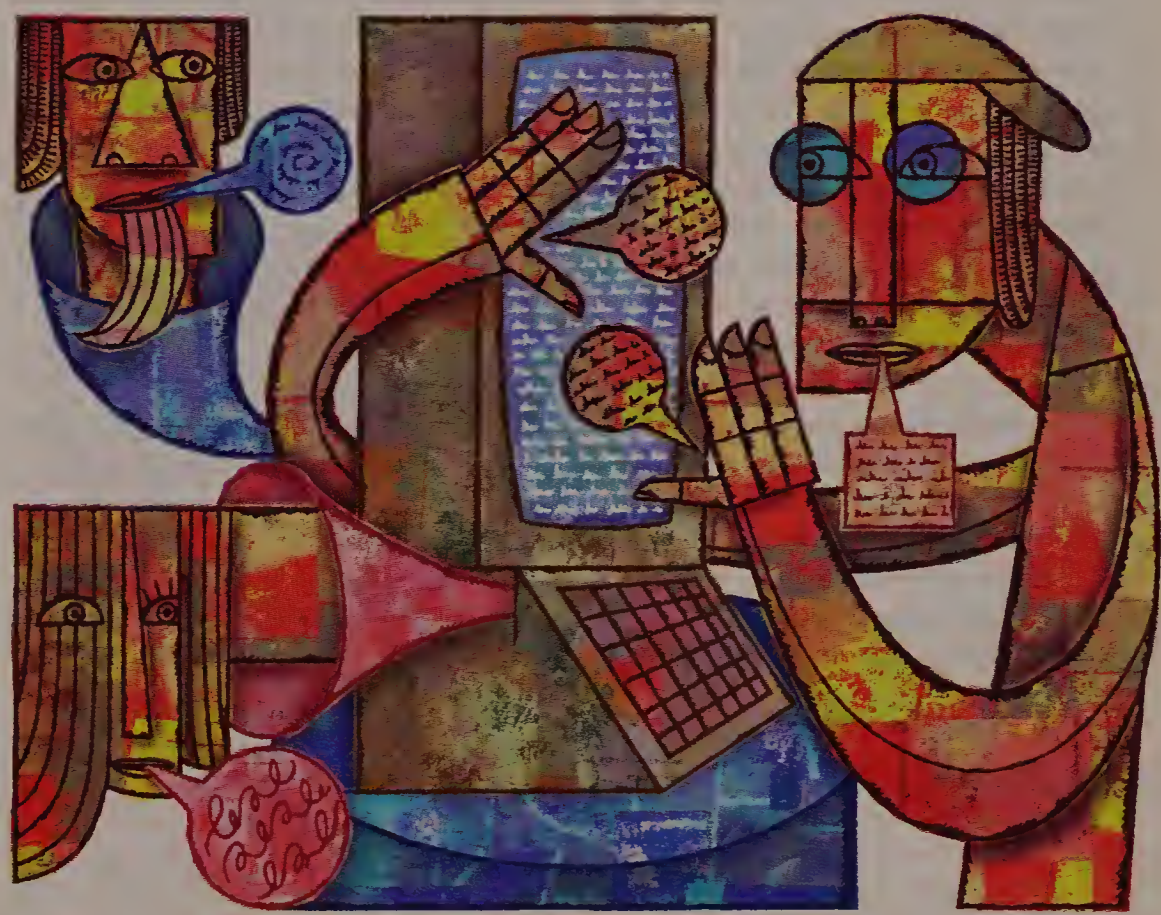
Contributing editor MEL BECKMAN designs local- and wide-area networks and flies helicopters, but not at the same time.

Secrets

The Mac Speaks Out

SINGING—YES, SINGING—THE PRAISES OF TEXT-TO-SPEECH

by Joseph Schorr



Lately, I've been hearing strange voices. Twenty-two voices, to be exact—and they're all coming from my Mac. Some of them whisper, others laugh hysterically. A few of them sing. A mental breakdown? No, just a dose of Text-to-Speech 1.5, Apple's speech-synthesis technology. Now I find myself spending more and more time listening to Bruce and Victoria—and occasionally even Zarvox.

Text-to-Speech allows your Mac to read (or in some cases sing) text aloud in a variety of synthesized voices from any speech-aware program and—if you have version 1.5—to read the System's standard alert dialog boxes to you. The latest version of the speech software (1.5) comes with Mac OS 7.6, but you can download English Text-to-Speech 1.4.1 free from Apple's Web site (*www.info.apple.com*; from there search the U.S. software archive for PlainTalk). The good news is that 1.4.1 works on older Macs and doesn't require the latest OS. You can even use Text-to-Speech on 68000-based Macs running System 6.0.7.

Step-by-Step Speech

To pick the default voice your Mac will use, open the Speech control panel. Choose Voice from the Options pop-up menu, and you'll be presented with another pop-up menu containing the full list of available voices. To test a voice, pick it from the menu, then click on the little speaker button to listen to a sample phrase.

Some of these sample snippets of speech are hilarious. The alien-sounding Trinoids say, "We do not communicate with these carbon units." The Whisper voice hisses, "Hey you—yeah, you—who do you think I'm talking to, the mouse?" Ralph spouts off a geometry equation, while Fred boasts, "I sure like being inside this fancy computer." And four of the voices—Good News, Bad News, Pipe Organ, and Cellos—sing actual melodies.

To have one of these voices read back what you type, you need a speech-aware program such as Novell's WordPerfect 3.1, ClarisWorks 4.0 (see "Making ClarisWorks Talk"), or SimpleText. Or you can buy Jem Software's QuickTalk ($39.95; 303/422-4766, *www.arielpub.com/jem.html*), a small program that reads directly from the Clipboard.

In SimpleText, you just open any document and choose Speak All from the Sound menu (or press ⌘-H) to have your

continues

Mac read aloud. If you select some text first, SimpleText reads only the selection. By default, SimpleText uses the voice you picked in the Speech control panel, but you can switch to any other voice using the Voices submenu under the Sound menu.

Punctuation Counts

The Mac's speech synthesizers read more than words; they heed punctuation quite well. Periods cause the pitch to drop off at the end of sentences. Question marks raise the inflection. Commas and colons generate a slight pause, while exclamation points add a touch of extra emphasis.

To hear the Mac's singing voices in all their glory, though, leave the punctuation out. Every time one of the singing voices encounters a punctuation mark, it tries to start its song over again, resulting in a series of false starts. Without punctuation, voices such as Good News or Cellos will mellifluously sing their way through your document without interruption.

If you want to add some dramatic pauses between phrases, you'll find that typing repeated periods, commas, or colons won't work. In fact, it appears that the Mac's voices won't pause for anything longer than a period—unless you know this completely undocumented secret: MacinTalk 3 voices interpret the vertical bar character (|) as a long pause—and you can type in as many of these as you want to create extremely long pauses, even minutes, between words and sentences. Using this technique you can produce some eerie effects. For example, you can start your Mac talking when you leave for your coffee break and have it intermittently say things while you're gone. The effect is particularly dramatic if you move SimpleText into the background once it starts speaking; it's as if your Mac is just speaking its own mind.

(Don't try this with the Agnes, Bruce, or Victoria voices; they're the newer MacinTalk Pro voices and they actually say "bar, bar, bar, bar . . .")

Custom Dialog Alerts

You can also have the Mac speak your alert dialog boxes if you're using Text-to-Speech 1.5, which comes with Mac OS 7.6. To have your Mac announce each alert, open the Speech control panel, switch the Options pop-up menu from Voice to Talking Alerts, and check the Speak The Phrase box. Then choose one of the 12 default phrases. Or you can choose Random from the list, so you never know what your Mac will say next.

However, the real fun comes with adding your own phrases. Choose Edit Phrase List from the pop-up menu and type in whatever you want. Your Mac will blurt the new phrase whenever an alert dialog box appears. Don't let the small size of the text field in the Edit Phrase dialog box fool you; you can type (or paste) up to 256 characters of text. **m**

JOSEPH SCHORR is coauthor of *Macworld Mac Secrets*, fourth edition (IDG Books Worldwide, 1997). His Mac routinely reads his columns back to him in the Deranged and Hysterical voices.

Making ClarisWorks Talk

CLARISWORKS 4.0 IS ONE OF THE FEW PROgrams that really take advantage of Text-to-Speech, but the speech features are so well hidden, plenty of users never notice them.

To make ClarisWorks talk, you have to activate the Speak Text shortcut.

1. Choose the Edit Shortcuts command from the Shortcuts submenu, located under the File menu.
2. In the Edit Shortcuts dialog box, add t button with the lips on it to your palette Installed Shortcuts.
3. Now, clicking on the lips button makes t program speak the selected text.

You can easily turn the Speak Text co mand into a single keystroke by recording ClarisWorks macro that first selects all te then clicks on the lips button for you.

Speak Your Own Mind

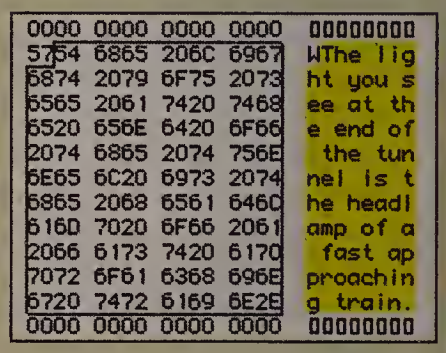
Most of the sample phrases uttered by the voices in the Speech control panel are pretty funny—but some of the newer voices aren't as entertaining. Victoria, for example, just says "MacinTalk Pro English Victoria."

Fortunately, it's easy to create your own sample sentences for any one of these voices, using ResEdit.

1. Open a copy of the MacinTalk 3 or MacinTalk Pro voice file you want (they're located in the Voices folder, inside the Extensions folder) with ResEdit.

2. Double-click on the ttvd resource icon, then open the only ttvd resource listed. In the rightmost column (the ASCII column) of the hex code window you'll see the voice's default phrase. Simply select that text and replace it with your own, with one proviso.

Here's the catch: In order for the voice to work properly, you have to replace the default phrase with text containing exactly the same number of characters. If you're off by one character, the voice won't work. Fortunately, punctuation marks and spaces count, so you can pad your sentences if needed.



3. After you've typed in your new phrase, save the file (do not rename it) and swap it with the original voice file in the Voices folder, then restart your Mac. (Make sure you've removed the original voice file from the System Folder; renaming it and leaving it in the Voices folder won't work.)

From now on, when you click on the speaker button in the Speech control panel, the voice will speak your custom phrase.

Quick Tips

Tips, Tricks, and Shortcuts

by Lon Poole

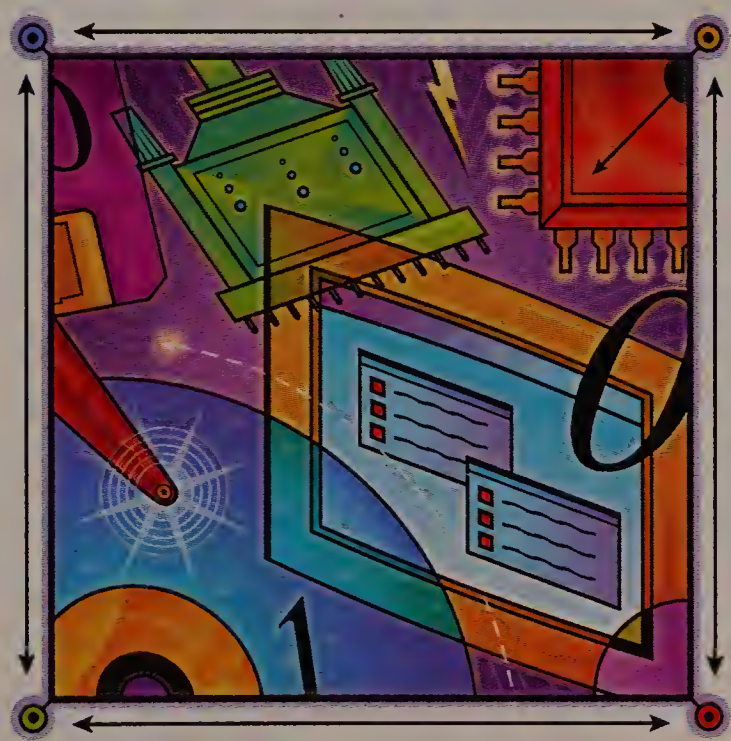
Pop quiz: A program crashes on your Power Mac, but you don't get a Type 11 system error forcing you to restart your Mac. Because you upgraded to Mac OS 7.6.1, you instead see the message, "The program 'Web Surfer' has unexpectedly quit (1)," and find yourself back in the Finder with all other open applications still running. Should you (a) keep on working, or (b) restart?

Next question: The program you're using freezes and ignores mouse-clicks and ordinary keyboard commands such as ⌘-Q. Like many Macintosh users, you know that sometimes you can force a frozen program to quit by pressing ⌘-option-escape. If you're lucky, you end up in the Finder with other applications still operating. Do you (a) keep on working, or (b) restart?

When you find yourself back in a functioning Finder after you force-quit a frozen program or the OS unexpectedly quits a crashed program, you may be tempted to choose (a) and keep on working. *Bzzzt!* Resist temptation and go with (b) in both cases. The current Mac OS doesn't have *memory protection*, which is a method of keeping an application from taking other open applications along for the ride when it crashes. Without memory protection, an errant program may invade other open applications' memory and trash their program code before the misbehaving program unexpectedly quits or you force it to quit. Applications with trashed program code can behave unpredictably. Keep working and you may stay lucky, or you may crash harder.

When an application quits unexpectedly or you force a frozen application to quit, you should immediately save all open documents and restart or shut down with the Finder's Special menu. If you want to be extracautious, save all open documents with new file names in case the system crashes while saving.

Incidentally, you get fewer Type 11 crashes with Mac OS 7.6.1 because 7.6.1 copes with program errors more gracefully than do earlier 7.6 versions. It doesn't actually stop errors from happening, but it reports them more accurately. This is the first Mac OS to properly classify specific system errors occurring in PowerPC-native programs as well as in 680X0 programs running on 680X0 machines or emulated on PowerPC machines. Previously, the Mac OS classified all system errors in PowerPC-native code as "miscellaneous hardware exceptions," reported them as Type 11 errors, and forced a restart. Mac OS 7.6.1 reports the true errors—a bus error (type 1) when a program tries to access nonexistent memory, an address error (type 2) when a program tries to execute instructions at odd memory addresses, an illegal-instruction error (type 3) when a program gets lost and tries to execute data as if it were an instruction, and so on—and for most of them it forces the active application to "unexpectedly quit." You have a chance to save your work before restarting or shutting down to restore maximum stability.



Uncovering a Modem Port

Q. I have a Macintosh 6200CD with a Global Village 14.4-Kbps internal modem. I want to switch to an external modem. I am told I need to remove the internal modem from the communications slot and install a network card.

M. E. Forgett
Vancouver, Washington

A. All you have to do is remove the internal modem card. You don't have to install an Ethernet card or other network card, although the modem port will still be available if you do. This applies to any desktop Mac with a communications slot (type I or type II), including members of the 570, 580, 630, 5200, 5300, 5400, 5500, 6200, 6300, 6400, and 6500 families.

Transparent GIF Image

Q. The story "Make Your Web Graphics Take Off" was very interesting (*Macworld*, May 1997). But it says that you can usually make a GIF image transparent by turning on an option in the Webpage–editing program. Where is the option in Claris Home Page 2.0?

Jayme Allen
Iowa Falls, Iowa

continues

A. First double-click the GIF to bring up Home Page's Object Editor window for the image, and then click the Set button in that window. This brings up a window in which you can change the GIF's transparency and interlace. (Shortcut: control-click or ⌘-click the GIF to pop up a contextual menu, and from it choose Edit Transparency/Interlace.)

In the transparency/interlace-editing window, click one color in the image that you want the page background to show through. For example, you can make a GIF's white border transparent by clicking the color white in the transparency/interlace-editing window. Note that as you move the pointer over the image in the editing window, the pointer changes to an eyedropper. You can use the magnification pop-up menu in the editing window to make it easier to distinguish the colors of the image.

Finally, close the transparency/interlace-editing window, saving changes when Home Page asks if you want to.

To remove transparency from a GIF, bring up its transparency/interlace-editing window as described above and click the Remove Transparency button.

Start-up Sound Off

Q. I have to work on my computer late at night, and I would like to know how I can eliminate or lower the sound it makes when I boot it.

MOSHE KASMAN
New York, New York

A. Plug earphones or headphones into the sound-output port (you don't have to wear them). As you've no doubt discovered, you can't quiet the start-up chime by setting the sound volume to zero with the Sound or Monitors & Sound control panels.

More Efficient Browser Cache

Q. I enjoyed your advice on using an AppleScript to mount a RAM disk as a Web browser's cache and then open the browser (*Quick Tips*, April 1997). Can AppleScript quit the browser and put away (⌘-Y) the RAM disk, thus freeing up the memory it used?

DON SHUWARGER
Goode, Virginia

A. Yes, but AppleScript can't make putting away a cache disk a seamless part of a Web browser's Quit command. You can come close by putting an appropriate AppleScript program in the Apple menu, where you can easily choose it to quit the browser and put away the cache disk. For example, you could save the following two AppleScript statements as an application named Quit Navigator RDC and put it (or an alias of it) in the Apple Menu Items folder:

```
tell application "Netscape Navigator™ 3.01" to quit
tell application "Finder" to put away disk "Internet Cache"
```

If you want the script to close your PPP connection as well, add the necessary statements after the first line of the script. For example, the following line will close an Open Transport/PPP connection:

```
PPP disconnect
```

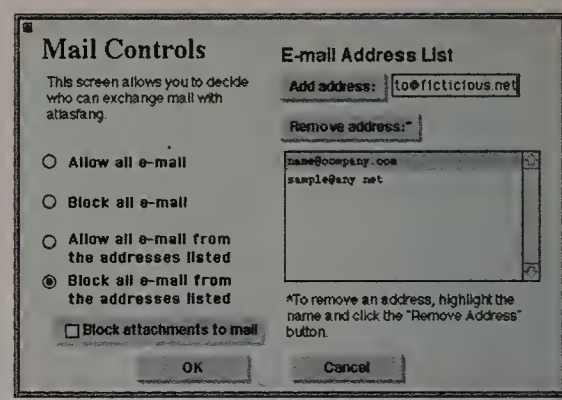
For a bit tighter integration with the browser, you could use a macro utility to run the AppleScript application when someone using the browser presses ⌘-Q. Macro utilities include OneClick from WestCode Software (619/487-9200, *www.westcodesoft.com*); QuicKeys from CE Software (515/221-1801, *www.cesoft.com*); and if you're the programmer type, KeyQuencer from Binary Software (310/449-1481, *www.binarysoft.com*).

Spam Stopper

TIP Everybody hates getting junk e-mail, or spam. On America Online there is an easy way to stop this. When signed on under the master screen name for your account, go to keyword *mailcontrols*. In the Welcome To Mail Controls window, click the Go To Mail Controls button to bring up the Mail Controls dialog box. There you select the option Block All Email From The Addresses Listed and enter the e-mail addresses you want blocked (see "Spam Guard"). I drag and drop annoying senders' addresses into the Note Pad and add them to mail controls about once a week.

ERIC M. FRASER
Paradise Valley, Arizona

AOL encourages you to forward your unsolicited junk e-mail to screen name TOSspam *so the company can block e-mail from sites outside AOL that don't effectively deal with junk mailers. For more information, or if you prefer to receive the junk e-mail that AOL normally blocks, go to keyword* preferredmail.—*L.P.*



Spam Guard For each screen name on your AOL account, you can compile a list of e-mail addresses from which you don't want to receive mail (or a list of only the addresses from which you want e-mail). The AOL keyword that gets you to this service is *mailcontrols*.

Cross-Platform Trouble in Word 6

TIP In the process of transferring Microsoft Word 6 documents between Mac and Windows machines, I've encountered problems with EPS graphics that are inserted in the Word documents, including EPS files created by the LaserWriter printer driver (as described in *Quick Tips*, May 1997). They simply won't print. I've come up with a rather tedious fix that, while hardly pleasant or straightforward, at least lets you and a Windows colleague exchange a Word document that contains EPS graphics.

The problem occurs when you insert a cross-platform–transferable EPS graphic into a Word 6 document without a link to the source file. If you choose Picture from Word's Insert menu, and leave the Link to File option turned off (the default) in the dialog box where you select the file to be inserted, you lose the link. An EPS graphic inserted by that procedure does not print when transferred from a Mac to Windows (or the reverse).

An EPS graphic that has been inserted in a Word document will print on both platforms if you turn on the Link to File option when you select the EPS file to be inserted. However, you must edit the field code for the inserted graphic so that it includes just the inserted file's name, not the full path to the inserted file. "EPS Crosses Platforms with Word" illustrates this procedure.

Remember when you transfer the Word file to also transfer the source files for inserted EPS graphics in it, and to

keep all the files in the same Word folder or Windows directory. Ah, for the simplicity of copy and paste!

STUART CRAIG
Deep River, Ontario, Canada

Manipulating Background Windows

TIP Sometimes you need to get at something in a background window that's covered by a window in front, but you don't want to bring the background window forward. For instance, you might want to drag some carefully selected icons from the frontmost Finder window to a folder in a background window. If you can see any part of the background window's title bar, you can move the background window without bringing it to the front by pressing ⌘ while dragging the background title bar.

BRYAN KOBLER
Park City, Utah

Also, if you have the WindowShade control panel set up to collapse windows when you double-click their title bars, you can collapse a window in the background without bringing it to the front by ⌘-double-clicking it. These ⌘-key tricks work only with background windows that belong to the active application.

If you've selected some icons to drag to another folder but you discover that you need to scroll a background window to bring the destination folder into view, you won't disturb the selection if you click only in the scroll bar or information header areas of the windows. Clicking anywhere else in a window, including the title bar, cancels the selection.—L.P.

AppleTalk without a Serial Port

TIP If you make AppleTalk inactive so you can access the Internet through the modem port and print to a StyleWriter or other serial printer through the printer port (see *Quick Tips*, May 1997), a bug in Open Transport 1.1.2 and earlier may crash your computer. You can activate AppleTalk to prevent the bug and still use a serial printer and a modem by installing the Remote Only extension, which is part of the Apple Remote Access Client software, and then setting the AppleTalk control panel's Connect Via option to Remote Only. The bug and the fix are described in more detail on the MacFixIt Web site *(www.macfixit.com/archives/february97-a.html#02-05-97)*.

LEE ALLEN
Everett, Washington

Even if the bug doesn't affect you, Remote Only lets you use applications that require AppleTalk, such as Stairways Software's shareware NetPresenz, while your computer is connected to a serial printer and a modem. The Remote Only extension comes with Open Transport 1.1.2, available from Apple's software updates site (www.info.apple.com/swupdates/). *The full Apple Remote Access Client 2.1 software comes with Mac OS 7.6.*

This Open Transport bug bites when you try to open a PPP connection a second time using RockStar Studios' FreePPP or other PPP software that is not Open Transport native (any PPP software that also works with MacTCP is not native). The bug doesn't surface when AppleTalk is active, and it shouldn't affect Apple's Open Transport/PPP software, which is Open Transport native (requires Open Transport). Also, America Online 3.0 software includes an extension, OpenOT, designed to prevent the bug whether AppleTalk is active or not.—L.P. m

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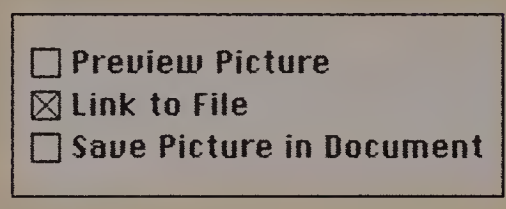
LON POOLE answers readers' questions and selects reader-submitted tips for this monthly column. His latest book is *Macworld Mac OS 7.6 Bible*, fourth edition (IDG Books Worldwide, 1997).

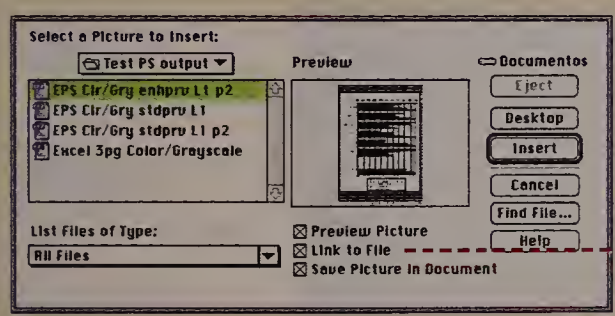
Shareware mentioned in *Quick Tips* is available from Macworld Online (*www.macworld.com*) or America Online (keyword *Macworld*).

We pay from $25 to $100 for tips on how to use Macs, peripherals, or software. Send questions or tips to *quicktips@macworld.com* or Macworld Quick Tips, 501 Second St., San Francisco, CA 94107. All published submissions become the sole property of *Macworld*. Due to the high volume of mail received, we can't provide personal responses.

EPS Crosses Platforms with Word

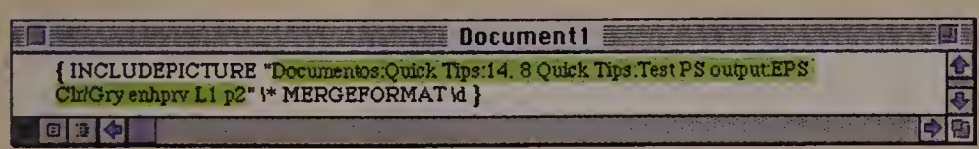
If you want an EPS graphic inserted in a Word 6 document to print on both Mac and Windows computers, you need to turn on the Link to File option when you select the file to be inserted (A).





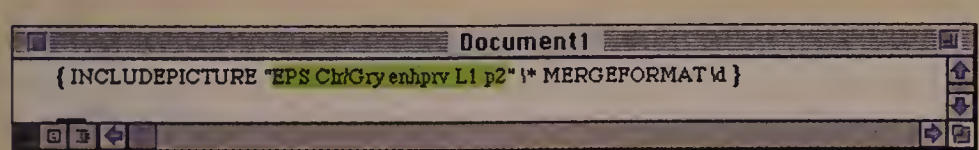
(A)

Next, set Word to display field codes by using the Options command in the Tools menu, by pressing option-F9, or by selecting the inserted graphic and pressing shift-F9. You will see that the inserted graphic's field code includes the full path to the file (B).



(B)

Then you must edit the field code to name only the inserted file, because the colons that separate Mac folder names are not compatible with the slashes that separate Windows directory names (C). Make sure the source file is in the same Mac folder or Windows directory as the Word document.



(C)

A FLIGHT *of* FANCY.

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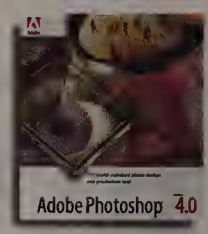

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Circle 253 on reader service card

Media

Sounds from a Can

HOW TO CHOOSE AND WORK WITH STOCK MUSIC AND SOUNDS

by Jim Heid

Soundtracks and sound effects are a big part of any media production. Or they should be—music and sound effects can evoke a mood and help drive home a point. A vast selection of royalty-free music clips and sound effects are available, and with the right software and editing techniques you can customize canned audio to make it sound fresh and original. Last month, I looked at buying and customizing stock photography, clip art, and canned user-interface elements. This month, it's the ears' turn. To hear some examples, visit *www.heidsite.com.*

Audio Auditions

Start by building a pantry of canned tunes, a place where you can find just the right sonic seasoning for a scene. Corel's Stock Music Library ($59.99; 613/728-3733, *www.corel.com*) includes 10 CD-ROMs containing 352 minutes of music—that's 17 cents per minute. The clips are first-rate, too, with a nice mix of styles and acoustic and electronic instruments. (Too many CDs sound like a lone musician with a synthesizer.) The clips are in 16-bit, 22kHz format, half the compact-disc sampling rate of 44kHz, so their high frequencies are a bit weak. But the fidelity is adequate for corporate or educational videos, and more than adequate for CD-ROMs, presentations, kiosks, and Web use.

Network Music's Presentation Audio (619/451-6400, *www.presentationaudio.com*) is a superbly recorded music and sound-effects CD-ROM series. Five volumes are currently available ($49.95 each; $199.95 for all five). The series is actually designed for Windows machines (each CD includes a Windows-based utility for locating clips by theme or keyword, exporting clips, and adding fade-ins and fade-outs), but don't let that stop you. The sound files are in WAV format (22kHz, 16 bits). Macs can mount the CDs, and you can audition and open the WAV files using any audio editor that supports WAV files, including Macromedia's SoundEdit 16, Bias's Peak, and Digidesign's Sound Designer II.

Janus Interactive (503/629-0587, *www.janusinteractive.com*) offers an awesome 5000 sounds in its 6-CD, $249 Janus Professional Sound Library. The sounds are in 44kHz, 16-bit stereo; a browser application lets you audition and search for sounds.

continues

Tools and Techniques for Soundtrack Building

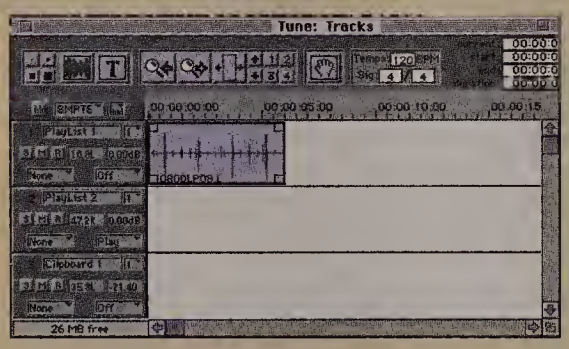
Here are several techniques for altering canned music clips, assembling "original" songs from instrument samples, and combining music with narration or dialogue.

ASSEMBLING A SONG

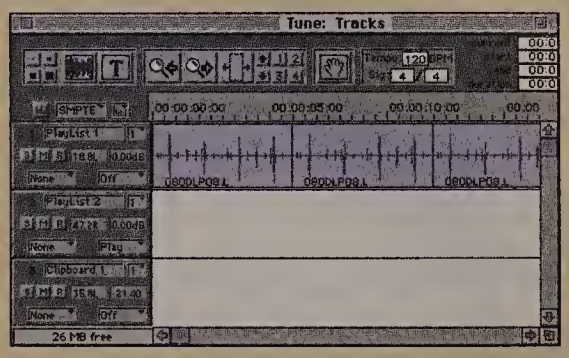
Many music-sample CDs contain drum, bass, and other instrument samples recorded so that you loop them (play them over and over—the term comes from the reel-to-reel–audiotape era, when experimenters would record a segment of music, cut the tape, and then splice its ends together, creating a loop that would play continuously or until the splice broke). By looping these samples, you can create a rhythmic track to use as is or as a background for your own composition. Here's how you might use Deck II to build a song out of clips from a music-sample CD.

1. After creating a new session, choose Add Audio to Clipboard from the File menu.

2. Load the clip you want to add, and then choose Paste from the Edit menu. This screen shows one measure of a drum loop. Now you need to repeat the measure.

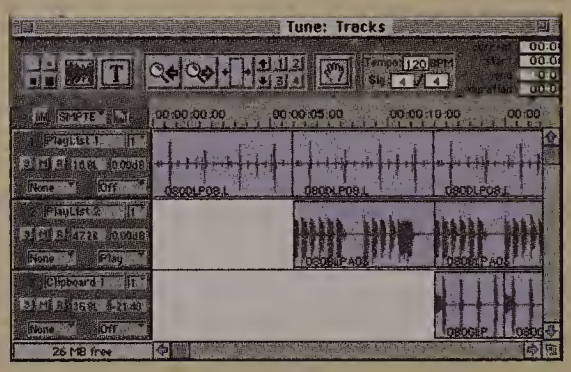


3. Choose Multiple Paste After from the Edit menu. In the subsequent dialog box, specify how many times you want the measure to appear.

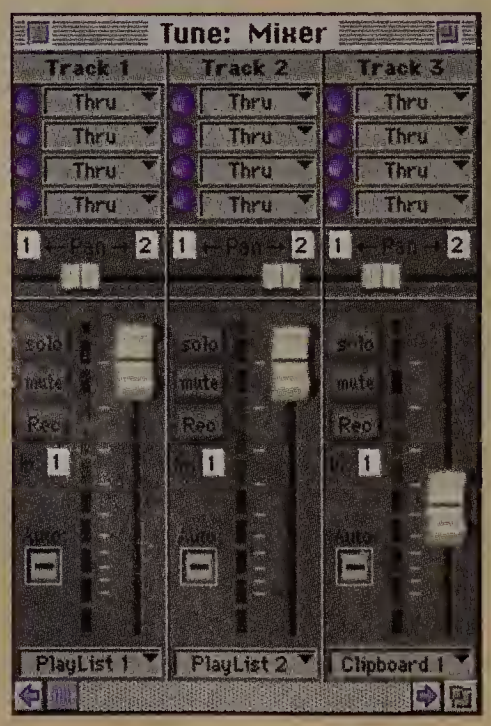


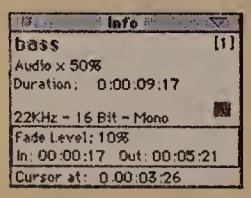
4. Deck II repeats the measure. In Deck II and other multitrack programs, pasting a clip in this way doesn't result in massive file sizes; the program simply plays the single sound file the number of times specified. This isn't the case in a waveform editor such as SoundEdit 16.

5. As outlined in the steps above, you can load and paste more sound clips into your song. Here, a bass line comes in on the third measure and is joined by a guitar on the fifth.



6. As you build the song, use Deck II's mixer window to adjust levels and to pan the instruments within the stereo field—for example, make the bars come from the left center of the field, the guitar from the right center.



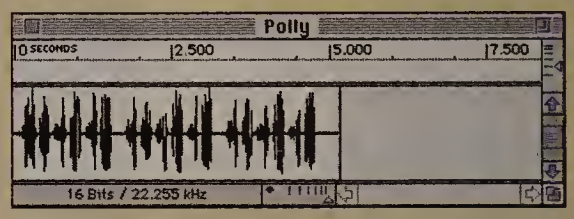


A PREMIERE TIP: Adobe Premiere doesn't let you specify a numeric value for a fade, but you can use the data in the Info window to make sure you're fading the level consistently throughout a production.

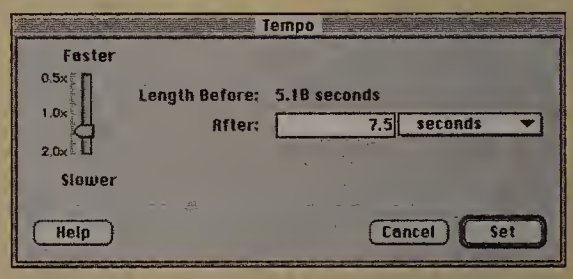
TWEAKING TEMPO

In SoundEdit 16 you can speed up a song or slow it down to make it shorter or longer.

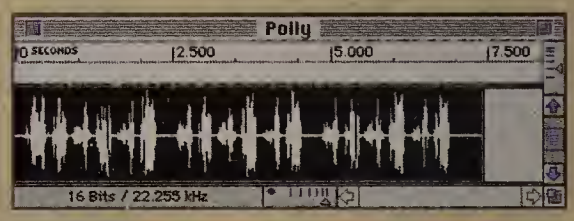
1. This music hit is roughly 5 seconds long, but you want it to fill a 7.5-second scene.



2. Select the sound and choose Tempo from the Effects menu. In the Tempo dialog box, type the desired length.



3. SoundEdit 16 resamples the sound to the required length while preserving its pitch.



ADJUSTING LEVELS

Make sure your background music stays in the background. In this Adobe Premiere production, a soundtrack's level drops when a narration begins. To adjust a track's level in Premiere, click on the fade-control line (the horizontal line beneath the waveform display) to create a handle, and then drag the handle down. You can add more handles by clicking elsewhere on the fade-control line. To remove a control point, drag it out of the fade-control area.

Fade-control line

With Jawai Interactive's (512/469-0502, *www.jawai.com*) $99 Java Beat, you use an attractive graphical browser to audition 250 audio clips. The clips are organized into 12 themes; each theme has a main song and up to 25 variants with different arrangements. This approach lets you use music the way movie and TV orchestrators do, applying the main theme at the beginning of a production, for example, and then using variants at key points throughout.

If you're looking to add music to a Web site, begin by reading my March 1997 *Media* column to learn about MIDI music files. Then sprint to *www.headspace.com/beatnik/* to learn about Headspace's Beatnik, an awesome new technology that provides MIDI's low-bandwidth advantages but without MIDI's main disadvantage: lack of control over the quality of the sounds a visitor hears.

Unlike standard MIDI files, Beatnik's proprietary Rich Music Format (RMF) can hold both MIDI playback data and sound samples. You can create your own RMF files with the Beatnik Editor (currently in free public beta). Headspace also offers three volumes ($49.95 each) of top-quality RMF files. Beatnik's key drawback? Visitors must download and install the Beatnik plug-in to hear your tunes.

Fit to Be Timed

A common challenge for media producers is to find a music clip of a specific length—say, to fit a 98-second concluding segment of audio or video. Producers of yore would often simply fade out the music at the end of the scene. Or they might fade it in, timing the fade-in so the piece would end when the scene did. Or they might hunch over a splicing block to cut a piece of tape to the required length.

Sound-editing software eliminates splicing blocks and provides several routes to on-time audio. One method is to add or remove verses or bars until the clip is the desired length. You need a musical ear for this, at least enough of one to know when a verse or bar begins and ends. It's labor intensive, but you do have Undo, Revert, and Save As—commands no splicing block affords.

If a piece is close to the required length, there's another option. Many sound-editing packages let you adjust a recording's tempo without affecting its pitch. In SoundEdit 16, for example, use the Effects menu's Tempo command. Extreme shifts (say, doubling a song's length) introduce hideous aural artifacts, but minor tweaks (say, going from 90 seconds to 98 seconds) generally work well.

Another way to obtain clips of a specific length is with AirWorks' (403/424-9922, *www.airworks.com*) $399 TuneBuilder. With this groundbreaking program, you pick a clip and then specify a length. TuneBuilder generates a tune of the required duration by assembling chunks of the chosen clip. (You can also build a piece yourself by dragging and dropping song blocks.) TuneBuilder's user interface is rough around the edges, but the results will thrill anyone who has struggled to edit a clip to fit a scene.

A similar program, Sonic Desktop Software's (818/718-9993, *www.sonicdesktop.com*) $199 SmartSound for Multimedia 1.5, has a cleaner interface than TuneBuilder, can import and display thumbnails of QuickTime movies (ideal for scoring movies), and can export files in RealAudio format (ideal for Web work). The downside is you're limited to the SmartSound CD's 74 minutes of music. TuneBuilder works with a variety of third-party music libraries.

Can Openers: Tools for Stock Audio

To work with canned audio, get Macromedia's (415/252-2000, *www.macromedia.com*) SoundEdit 16 with Deck II bundle ($419 included with the Director Multimedia Studio). Use SoundEdit 16 to create audio loops and add effects; use Deck II to build songs from sample CDs.

One way to customize stock audio is to add effects. To make a dry recording sound more lush, give it some reverb. You can create reverb effects with SoundEdit 16, but for professional-quality results, add Waves' Native Power Pack ($600; 423/689-5395, *www.waves.com*). These modules works with any program that supports Adobe Premiere–format plug-ins.

The Native Power Pack also includes the S-1 Stereo Imager, which lets you alter the spread of a stereo mix—for example, to make it sound broader, or to emphasize the left channel. You also get several audio-optimizing tools that I've raved about in past columns (see *Media*, April 1996).

Build Your Own Band

If you have some audio software and a musical ear, you can assemble your own quasi-original tunes from canned instrument-sample CDs. Dozens of CD-ROMs and audio CDs containing instrument loops and samples are available; they're popular among musicians who use MIDI sampling keyboards.

You might start with a drum loop, add a bass riff, and then layer some instrument samples on top. If you're a musician and have a MIDI sampler or use programs such as Mark of the Unicorn's Digital Performer or Opcode's Studio Vision Pro, you can go directly to heaven, using sample loops as a base for your own original tunes.

The hippest song-construction kit I've found is Sounds Good's $99.95 On a Jazz Tip (*www.ivo.se/sounds.good/*, distributed in the United States by East-West, 310/858-8797, *www.eastwestsounds.com*). Sounds Good offers a full library of loops and samples for musical styles ranging from country to rock to reggae.

Two more noteworthy sources for percussion samples are Ubiquity's (415/864-8448, *www.ubiquityrecords.com*) Master Drummers series ($12.99 each) and InVision Interactive's (415/812-7380, *www.cybersound.com*) $99 Percussion Slam. The Master Drummers series features dance-inspiring drum grooves by legendary jazz and funk veteran Bernard Purdie. Percussion Slam features Latin rhythms by Rafael Padilla, who has recorded with everyone from Aretha Franklin to Bob Seger to Julio Iglesias—hopefully not all at the same time.

Dealing in Volume

If you're using music beneath some narration or dialogue, be sure to keep the music's volume low to avoid overpowering the speech. Don't play background music continuously. Use it to highlight the beginning and ending; to punctuate key points, such as scene transitions or theme changes; and to spice things up when there is no dialogue. And as I mentioned in March's column, think at least twice before adding lots of music to a Web site; let visitors turn off the tunes if they choose. Background music is a seasoning, not a main course—especially when it comes from a can. **m**

JIM HEID's latest book is *HTML & Web Publishing Secrets* (IDG Books Worldwide, 1997).

Publishing Workshop

Publishing with FreeHand 7

by Olav Martin Kvern

Macromedia FreeHand is a great drawing program. It's also become, with version 7, a great page-layout program for short, complex publications. What's changed since version 5.5? FreeHand 7 adds key features that make it easier to manage imported files, printer settings, and color accuracy—all things you need from a publishing platform.

Managing Imported Graphics

In previous versions of FreeHand, you could import graphics, store graphics inside or outside the publication file, and even export graphics (as TIFFs, primarily). Keeping track of imported graphics files, however, was a chore. It was all too easy to find yourself at the service bureau without a file you needed to print your publication.

FreeHand's updated and improved Links dialog box is the key to managing imported graphics (see "Your Guide to the Links Dialog Box"). It's also one route to replacing images in a layout (see "Preserve Cropping While Changing Links").

Saving Printer Settings

When I create a FreeHand publication, I print it (at least) three ways: black-and-white proofs on a laser printer, color proofs on a color printer, and final copies on an imagesetter. Every time I change my printer type, I have to wade through the various panels of FreeHand's Print Setup dialog box checking that multitudinous settings are correct for the printer I'm using. The next time I print the publication, I'll probably have to walk through the options again.

With the arrival of FreeHand 7's Print Settings feature, my life got easier. Now I can, in effect, create printer styles and apply the settings as needed when I print. Here's what you do.

1. Choose Print from the File menu to display the Print dialog box.
2. Click on the Setup button. FreeHand displays the Print Setup dialog box.
3. Work your way through the three panels (Separations, Imaging, and Paper Setup) of the Print Setup dialog box, setting printing options as you normally would.
4. Click on the + button next to the Print Setting pop-up menu. FreeHand displays a standard Save As dialog box.
5. Enter a name for the printer setup you've just created, then save the printer setup file in the folder PrintSet in your FreeHand 7 folder. FreeHand adds the name of the printer style to the Print Setting pop-up menu.

Now you can just choose the name from the Print Setting pop-up in the Print dialog box. You'll save time and avoid

Preserve Cropping While Changing Links

When you swap imported graphics, FreeHand 7 doesn't scale the new graphic to fit the original space. You have to do that yourself. You can, however, get FreeHand to crop the incoming image (which is often what you want) into the area occupied by the original image.

1. Select the image, draw a path around it (here I used the rectangle tool), cut it, then choose Paste Inside from the Edit menu (A).

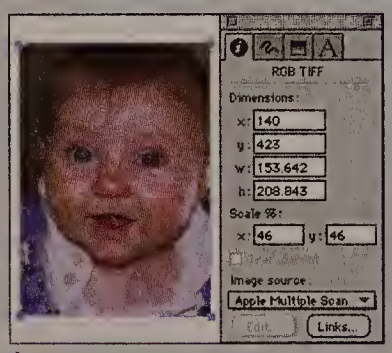
2. Choose Links from the Edit menu to display the Links dialog box. Or click on the Links button in the Object Inspector palette.

3. Select the image you want to change from the list of imported graphics, then click on the Change button. You get the Change Link dialog box.

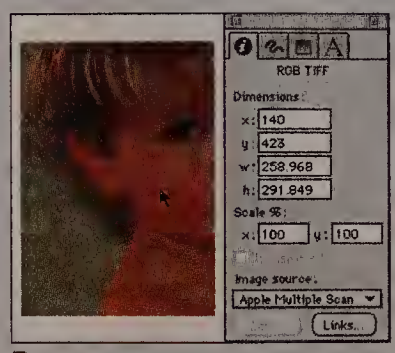
4. Select the new image, then click on the Open button.

5. Close the Links dialog box. At this point, the replacement image appears inside the clipping path you created earlier (B).

6. Option-click on the image to select the graphic inside the clipping path, then drag and/or scale the image until it looks the way you want it to (C). (Be sure to release the option key before dragging, or you'll duplicate the image.)



A



B

C

Your Guide to the Links Dialog Box

FreeHand 7's Links dialog box (which you get by choosing Links from the Edit menu) not only lists the graphics you've imported, where they came from, and where they're stored, but it also lets you change those attributes. Take the guided tour below to learn how to use it.

A. In addition to describing the file's location, this message tells you when a graphic is embedded (stored inside the publication) instead of linked (stored outside the publication).

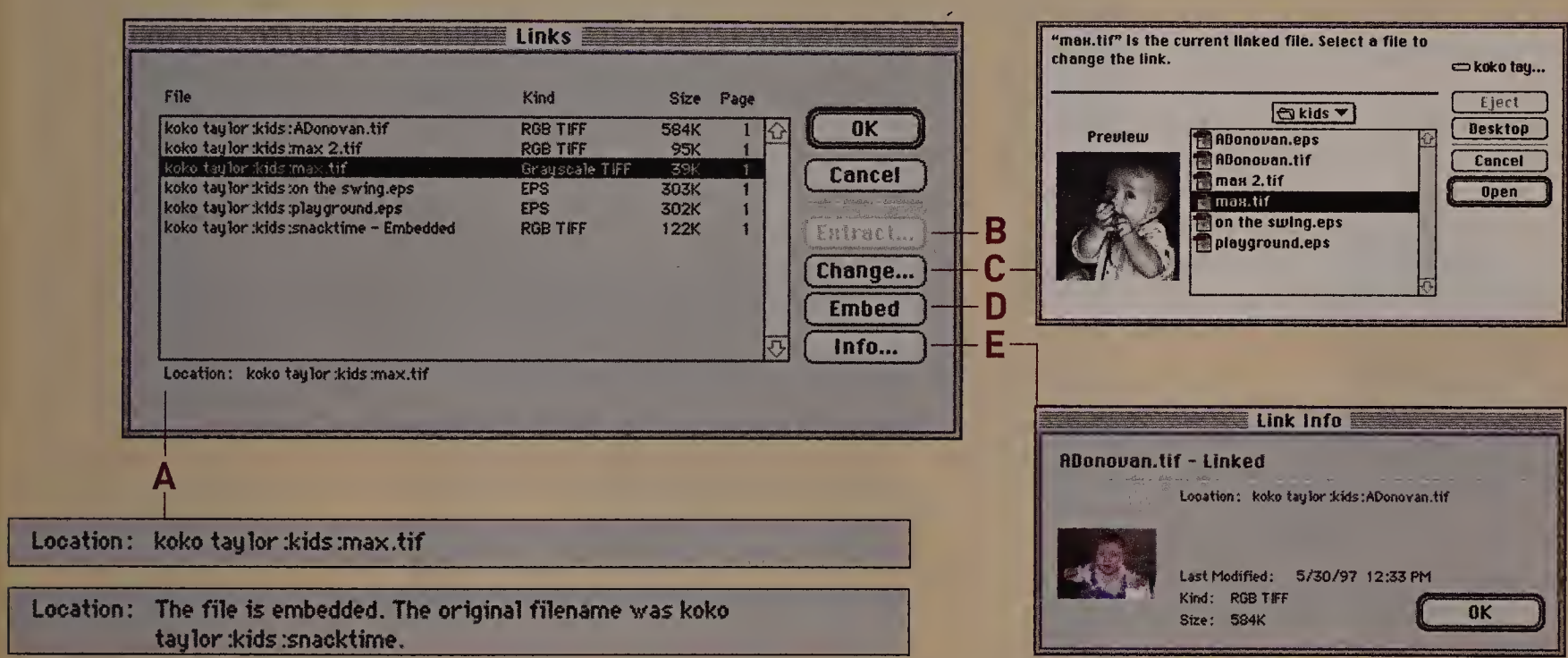
B. To turn an embedded graphic into a linked one, select the graphic from the list, then click on the Extract button. FreeHand displays a Save As dialog box. Select a drive and folder, enter a file name, then choose Save. FreeHand extracts and exports the graphic, then creates a link to the exported file.

Having the ability to extract graphics—and thereby reduce file size—is a good thing, because FreeHand frequently embeds graphics. For example, when you import image files in formats other than TIFF or xRes LRG, FreeHand converts the images to TIFF and embeds the converted file. When you apply an Adobe Photoshop filter to a linked image in your FreeHand publication, FreeHand applies the filter to an embedded copy of the image. This gives you the freedom to experiment with filters without fear of destroying the original image file. (Note that FreeHand does modify the original when you work on an embedded image.)

C. To change a graphic (embedded or linked), select the file from the list and click on the Change button. FreeHand displays the Change Link dialog box. Locate the file you want to import in place of the selected file and click on the Open button.

D. To embed a graphic, select it in the list of imported graphics, then click on the Embed button. FreeHand stores the graphic inside the publication file (which increases by the size of the graphic).

E. To get information on an imported graphic, select it from the list in the Links dialog box, then click on the Info button to get the Link Info dialog box.



the expense of printing with the wrong settings.

Making the Most of Color Management

A color-management system not only helps make what you see on screen more accurately match what you get in print, but it also helps produce better separations of imported RGB images. To enhance its publishing persona, FreeHand 7 supports ColorSync and the Kodak Digital Science Color Management System. Here's how to take advantage of them.

• ***Set Color-Management Options*** Press ⌘-shift-D (to display the Preferences dialog box), then click on Colors in the list at the left of the dialog box. FreeHand displays the Colors Preferences panel. Here you can turn color management on or off and choose *device profiles* (files that tell the color-management system your monitor's and printers' characteristics). Why would you turn color management off? It slows FreeHand's screen drawing.

• ***Set Options Individually for Imported Images*** If you want to print color separations of imported RGB images, you should turn on color management for those images. Select each graphic and choose a device profile (usually for a scanner or monitor) from the Image Source pop-up menu in the Object Inspector.

• ***Set a Default Profile for Imported RGB Images*** Choose a profile from the RGB Image Default pop-up menu in the Color Preferences dialog box, and FreeHand will apply it to new RGB images you import.

Reducing Stress

Admittedly, these aren't the most exciting features of FreeHand 7. But some excitement is better avoided: missed deadlines, frenzied press checks, and agonizing repetition of procedures. Use these handy publishing features, and you might have to find something else to worry about. m

OLAV MARTIN KVERN is a software developer, illustrator, graphic designer, and writer. He is also the author of *Real World FreeHand 7* (1997, Peachpit Press).

Graphics Workshop

Unusual Effects Using Curves and Blending

by Cathy Abes

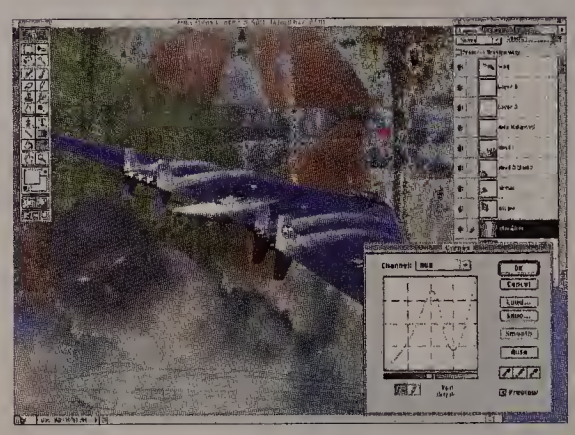
ARTIST David Peters is a digital illustrator, specializing in photo-collage, whose clients include *Air&Space/Smithsonian*, *Macworld*, *Time*, and Western Union. He teaches digital illustration at Otis College of Art and Design in Los Angeles.

HOW IT WAS DONE For this illustration, Peters composited scanned images using various combinations of Photoshop's Curves tool with blending modes to generate filterlike effects. Most of the collage elements were scans of photos he took while visiting Davis-Monthan Air Force Base and the Pima Air & Space Museum near Tucson, Arizona.

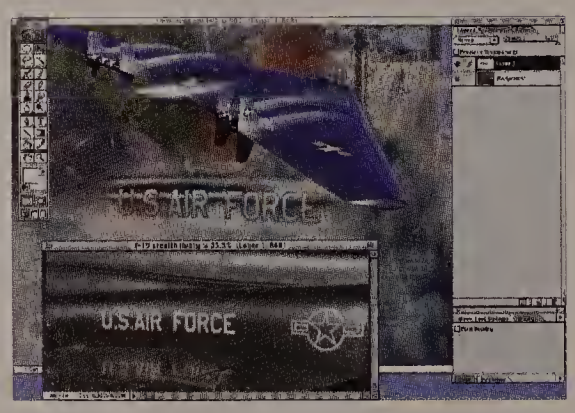
While most people think of Curves as just a gamma/color-adjustment tool that can create wild color shifts, you can also use Curves for much subtler effects, such as bringing out soft lines, edges, and textures that wouldn't ordinarily be visible. In compositing the various elements, Peters experimented by combining Curves with various blending modes, such as hue, saturation, and luminosity. Ultimately he settled on his favorite, luminosity, because it allows colors in the underlying layers to show through. Together with the textures brought out by Curves, this gave the image an aged, weathered look. Another advantage of Curves is the ability to save and reuse numerous Curves settings on any image.

TOOLS **Hardware:** Power Mac 9500/150 with 132MB of RAM, 2GB internal hard drive, 1GB external hard drive, and 1GB ProMax Iomega Jaz removable-cartridge drive; 21-inch NEC MultiSync XE21 color monitor; Microtek ScanMaker III color flatbed scanner. **Software:** Adobe Photoshop 4.0. m

1 The national insignia (known as the star and bar) was in a photo Peters took of an old aircraft from which most of the paint had flaked off, exposing bare metal.

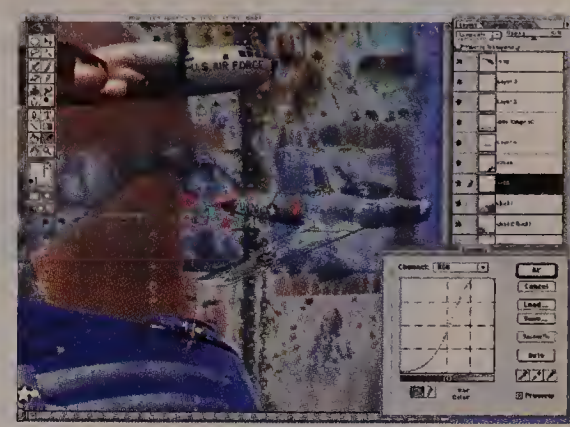


2 By experimenting with Curves on the star and bar he found settings that gave the image a solarized effect, but with more subtlety and control than Photoshop's Solarize filter offers. He saved the Curves settings he liked, then loaded them after compositing other elements of the image.



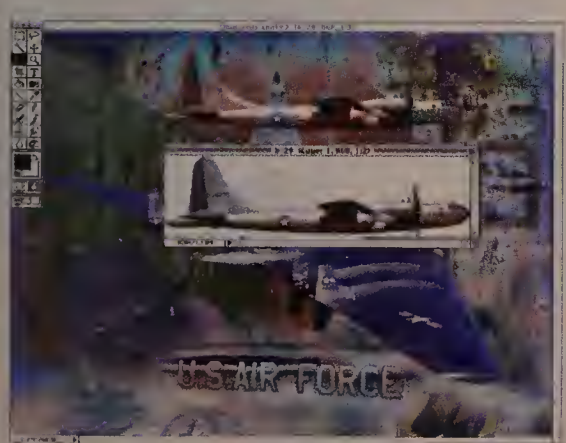
3 Peters selected the Air Force logo from an F-15 (inset) using a feather radius of 20 pixels. He composited it with the main image in Luminosity mode so that lower layers would show through. He found Curves settings that gave the letters an embossed, outlined look and accentuated the rivets and weathered metal of the fuselage.

4 The original scan of an F-86 Saber jet from the artist's collection of vintage photos.

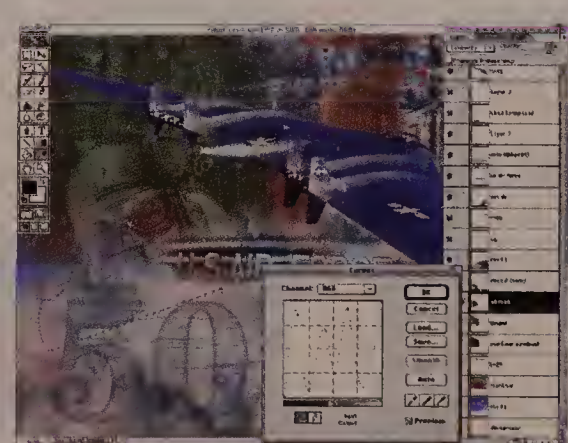


5 He composited the fighter plane on the right in Luminosity mode at 51 percent opacity, which allowed the background elements to show through, and then applied Curves settings that accentuated the weathered metal, producing a swirling, painterly effect.

6 The original scan of the airman from the artist's collection of vintage photos.



8 Compositing the original B-29 scan (inset) in Luminosity mode allowed the star-and-bar background to show through the plane.



7 After compositing the airman in Luminosity mode at 85 percent opacity, Peters tried several different Curves settings until he found one that produced a grainy, solarized effect.

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"... FOR EVERY FOUR SOFTWARE PROGRAMS PARENTS BUY FOR SONS, THEY BUY ONLY ONE FOR DAUGHTERS – EVEN THOUGH GIRLS AND BOYS AGES 6 TO 10 SPEND THE SAME AMOUNT OF TIME ON COMPUTERS"

—ACCORDING TO RESEARCH DONE BY MATTEL AND QUOTED IN NEWSWEEK, OCTOBER 23, 1996

"AROUND THE AGE OF 10, GIRL'S USAGE OF COMPUTERS FALLS OFF, JUST WHEN BOYS ARE DEVELOPING SERIOUS RELATIONSHIPS WITH THEIR DOOM AVATARS"

—NEWSWEEK, OCTOBER 23, 1996

Girls are just as interested in technology as boys. But finding technology products with girl-oriented content is difficult and many girls lose interest. This is about to change. **Tech Girl's Internet Adventures** is a lavishly illustrated, colorful new book that facilitates girls' involvement with technology, helping them build a place for themselves in the future.

In **Tech Girl's Internet Adventures**, Tech Girl, the perfect online guide for girls 8 and up, leads girls safely through Cyberspace. She introduces them to over 100 girl-oriented Web sites and gives them step-by-step instructions on using the Internet. She shows girls how to use online technology to explore their interests and communicate with other girls. Girls learn about themselves while they learn about computers.

Look for **Tech Girl's Internet Adventures** at your favorite bookstore or computer store. To order a single copy, call 800/762-2974. To order in bulk or volume, call 800/842-8996 ext. 3048 and ask for Eric Taylor.

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Monitors	◯	2	◯
Printers	◯	3	◯
Storage Devices	◯	4	◯
Networking/Data Communications	◯	5	◯
Internet/Intranet products/services	◯	6	◯
Software: business/productivity	◯	7	◯
graphics/design	◯	8	◯
interactive publishing/ multimedia	◯	9	◯
entertainment	◯	10	◯
education	◯	11	◯
other software	◯	12	◯
Any other products	◯	13	◯

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- ◯ 2. Difficulty in installing or using products
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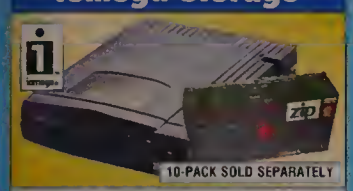

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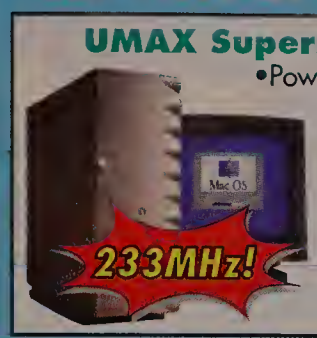

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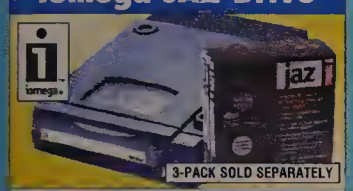

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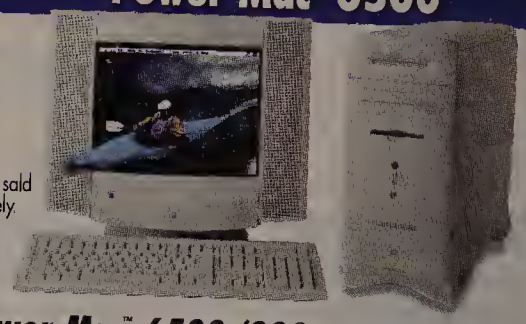

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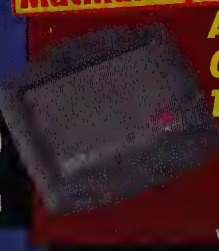

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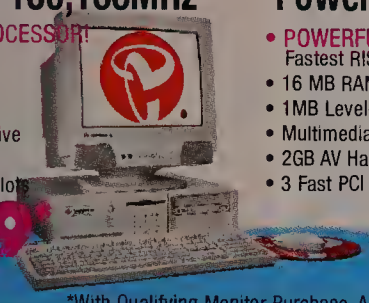

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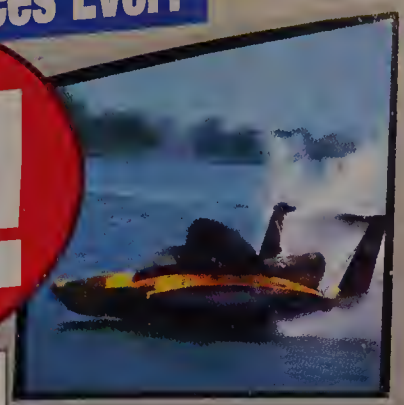

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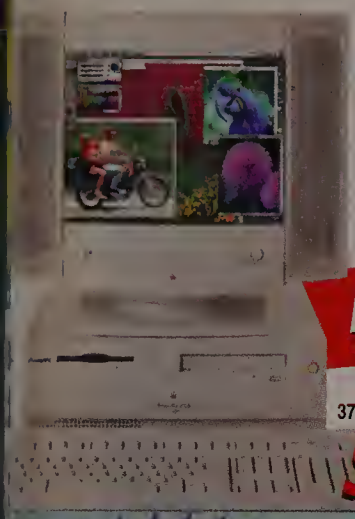

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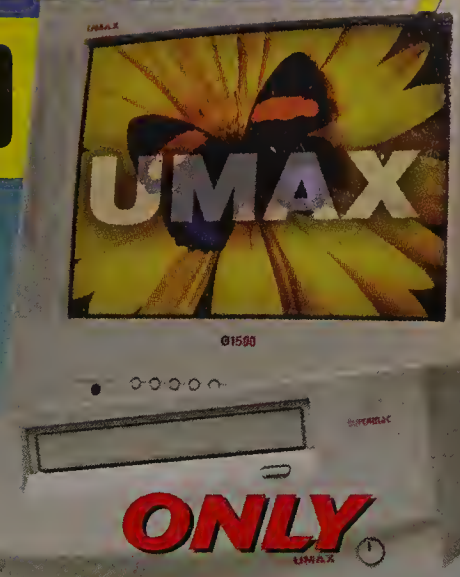

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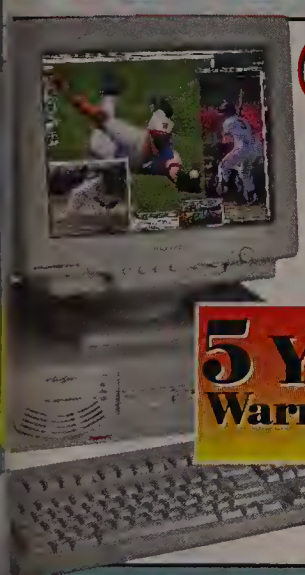

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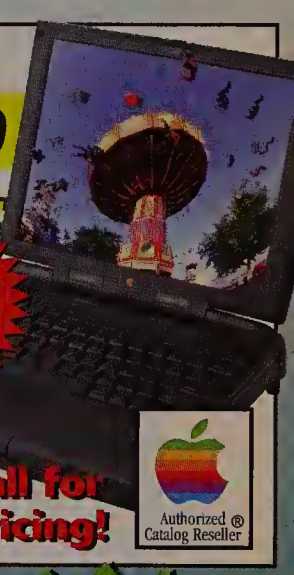

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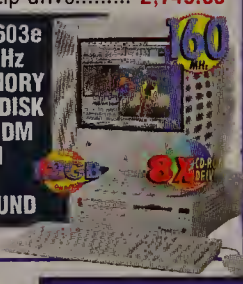

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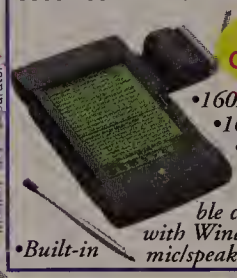

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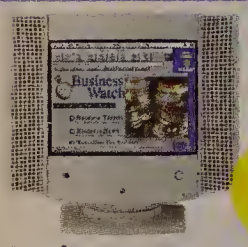

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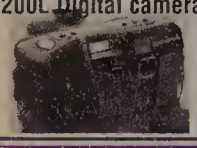

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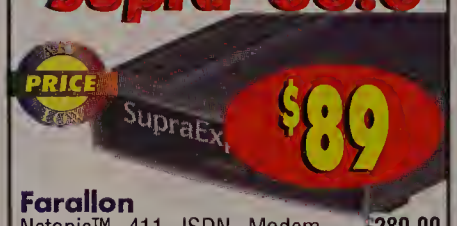

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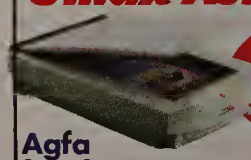

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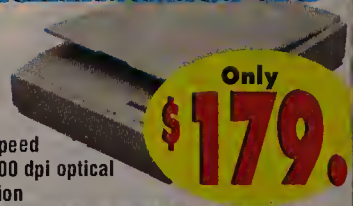

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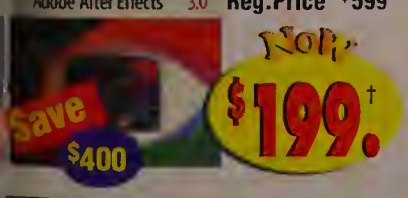

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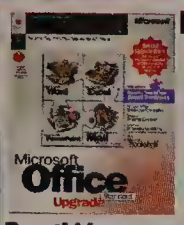

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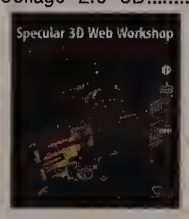

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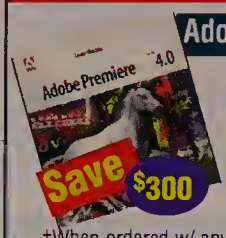

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WIDE SCSI							
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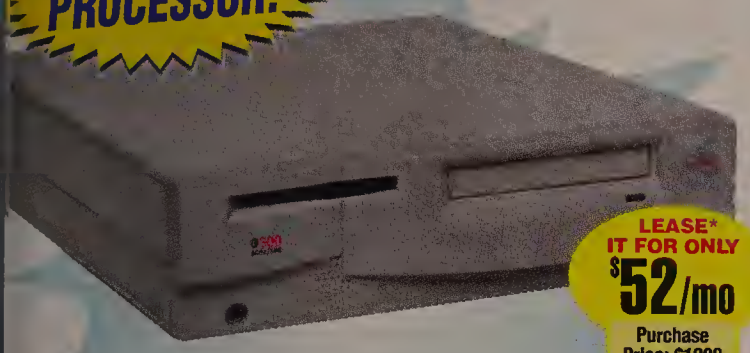

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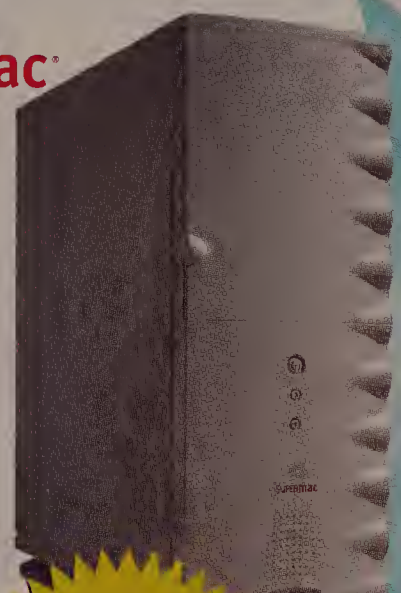

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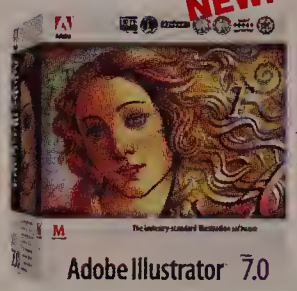

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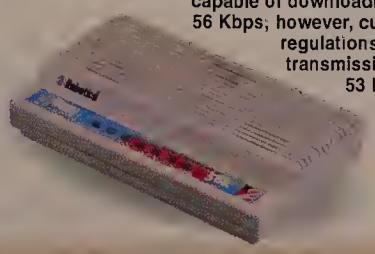

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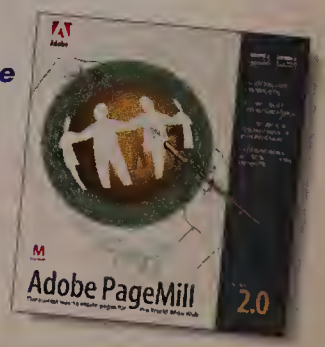

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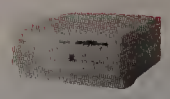

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Cache	✔ 512K level 2	256K level 2
VRAM	✔ 2MB	✔ 2MB
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'S ST 4500 W	Seagate Cheetah, 4348MB, 10000 rpm	N/A	N/A	1249.95
'S Q 9000 W	Quantum Atlas II, 8682MB, 7200 rpm	1399.95	1449.95	1499.95
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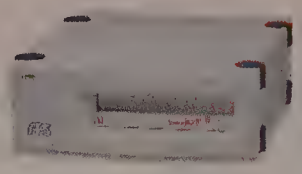

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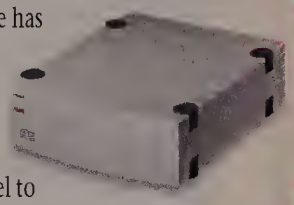

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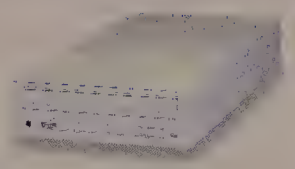

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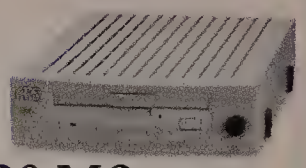

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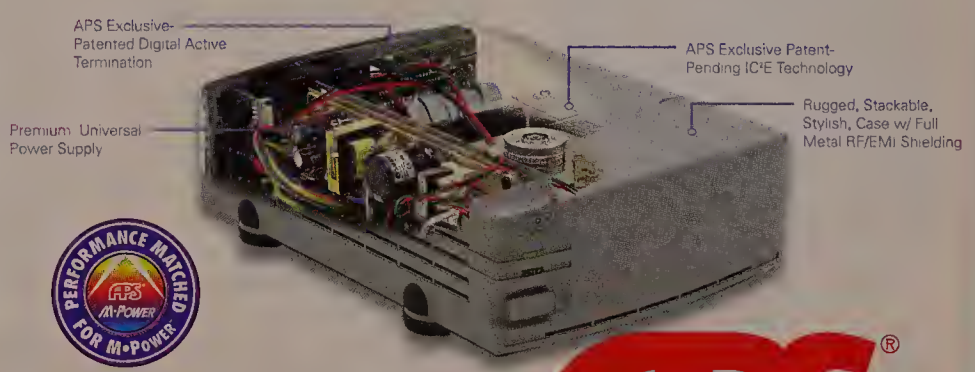

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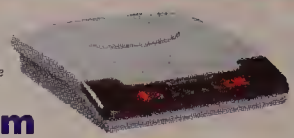

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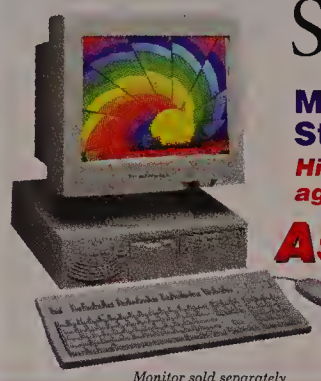

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2.1GB Barracuda 4LP	ST32171W	8.5ms	UltraWide SCSI-3	7200	$629	$709
4.3GB Barracuda 4LP	ST34371N	8.5ms	Ultra SCSI-3	7200	$839	$889
4.3GB Barracuda 4LP	ST34371W	8.5ms	UltraWide SCSI-3	7200	$899	$979
4.3GB Cheetah	ST34501N	8ms	Ultra SCSI-3	10000	$979	$1029
4.3GB Cheetah	ST34501W	8ms	UltraWide SCSI-3	10000	$1019	$1099
9.1GB Barracuda 9	ST19171N	8ms	Ultra SCSI-3	7200	$1539	$1589
9.1GB Barracuda 9	ST19171W	8ms	UltraWide SCSI-3	7200	$1599	$1679
23GB Elite 23	ST423451N	8ms	Fast SCSI-2	5400	$3149	$3249
23GB Elite 23	ST423451W	8ms	Fast&Wide SCSI-2	5400	$3249	$3349

IBM

IBM drives carry a 5 Year Warranty

Description	Model	Access	Interface	RPM	Int	Ext
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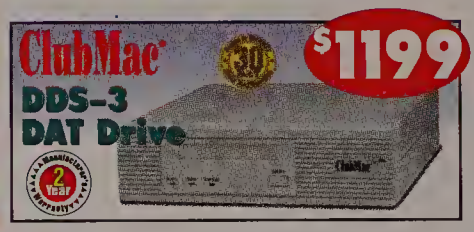

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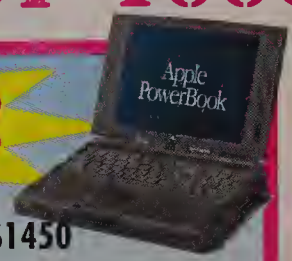

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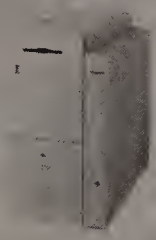

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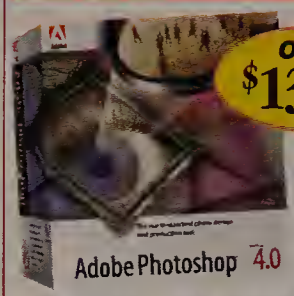

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144 GB	HP1559 DDS3	120 MB /Minute	3
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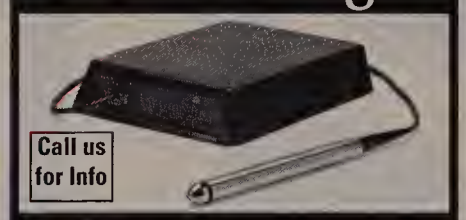

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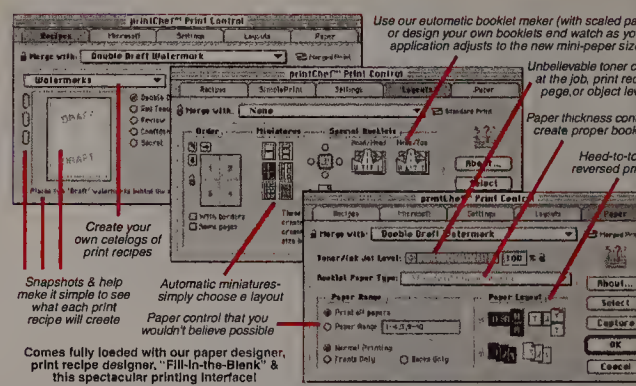

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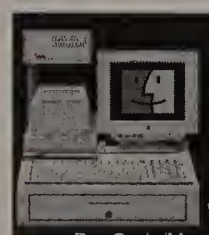

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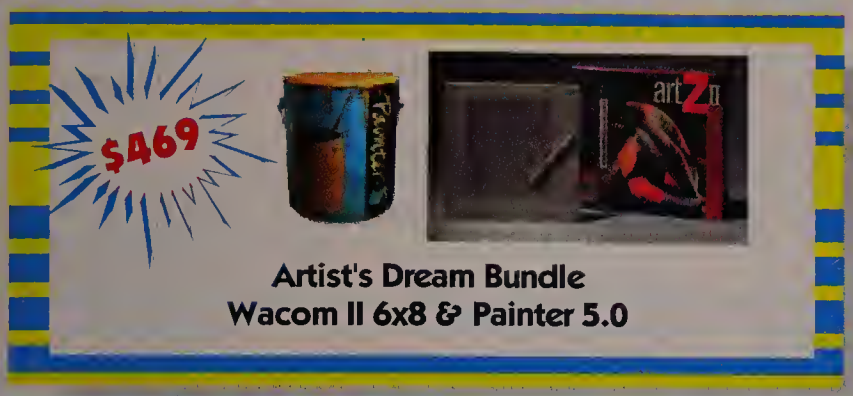

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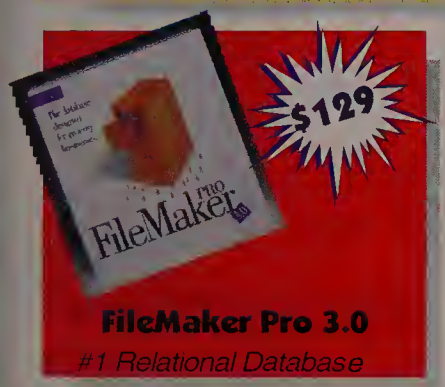

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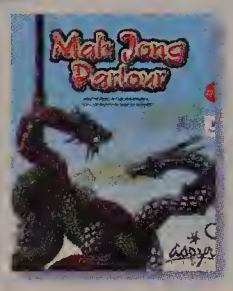

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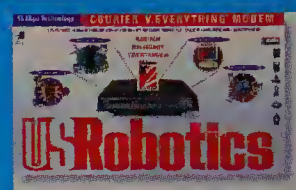

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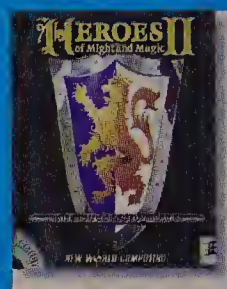

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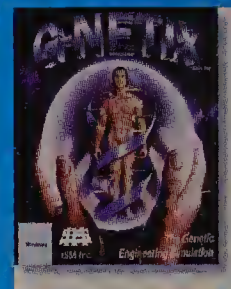

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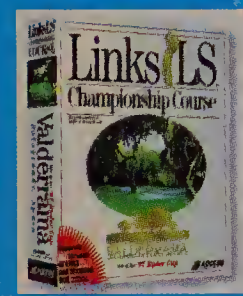

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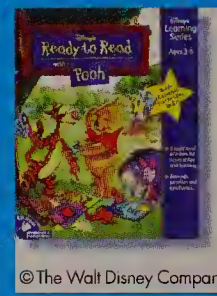

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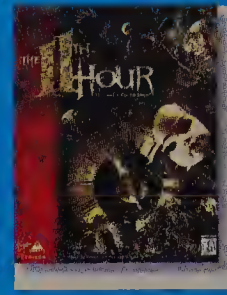

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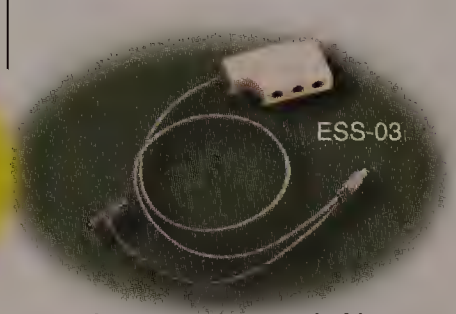

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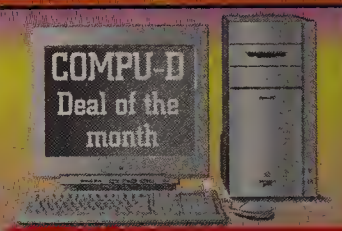

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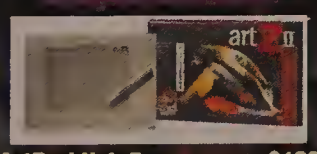

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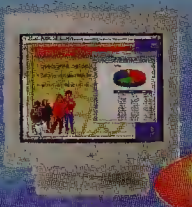

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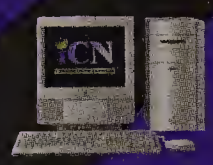

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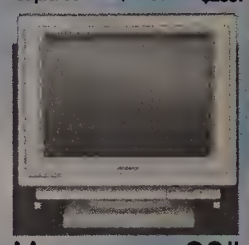

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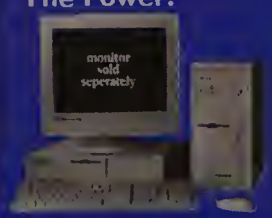

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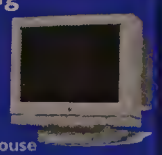

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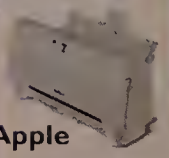

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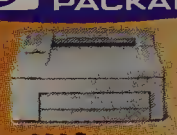

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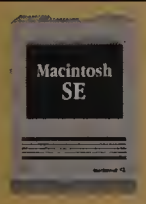

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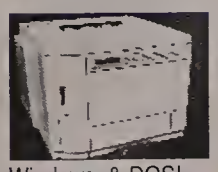

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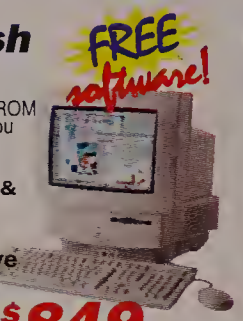

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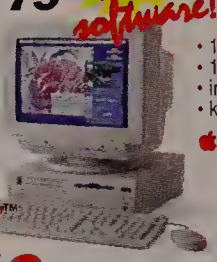

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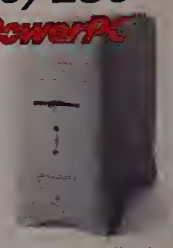

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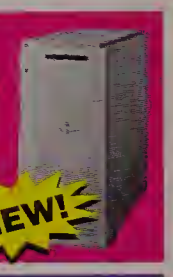

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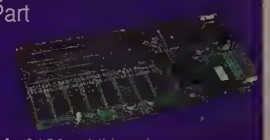

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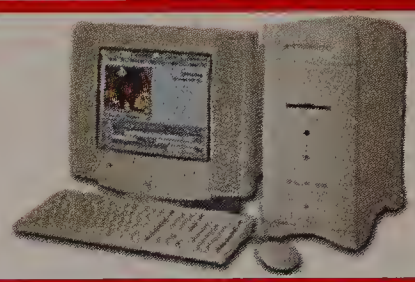

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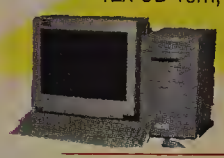

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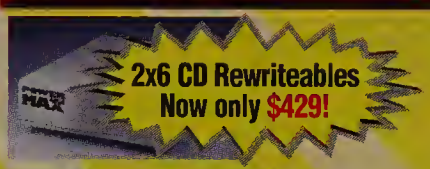

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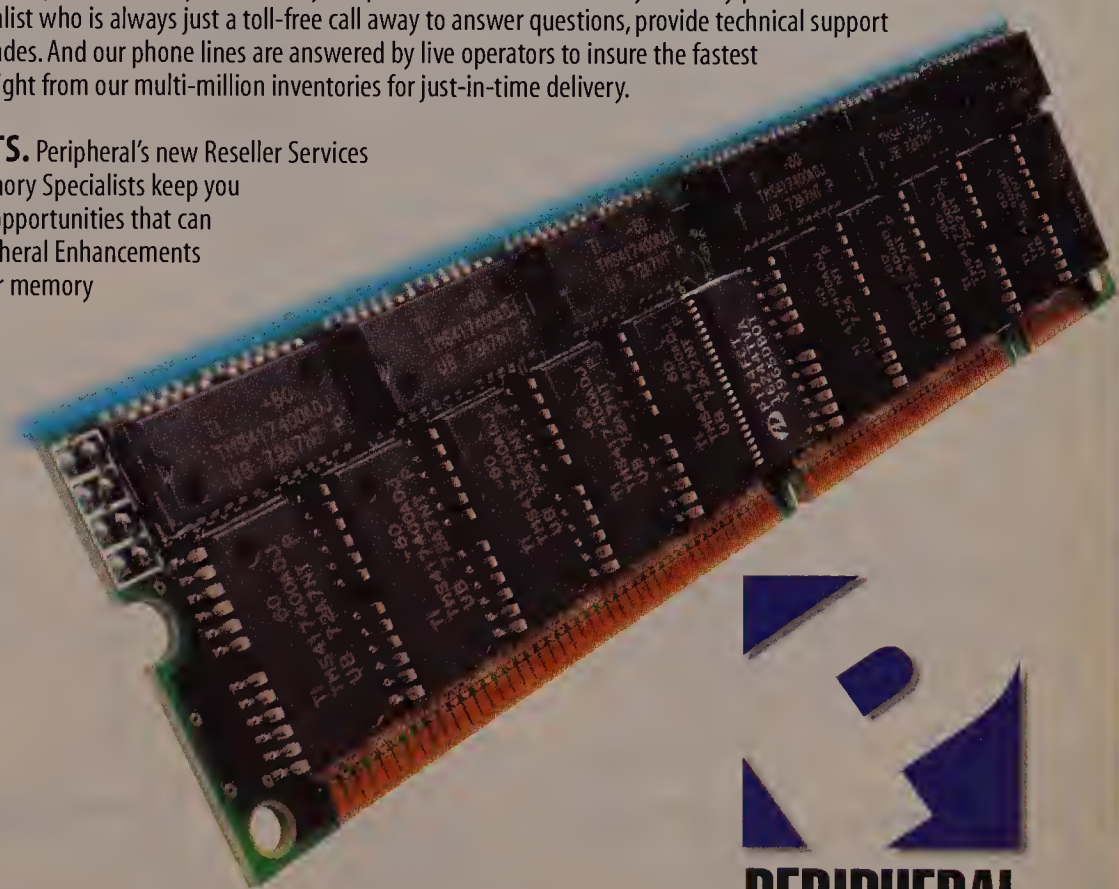

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Quantum	TM2110A	11 Ms	4500	EIDE-4	128k	$209	$259
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Quantum	AT32150S	8 Ms	7200	Fast SCSI-2	1024k	$429	$479
Seagate	52160N	11 Ms	5400	Ultra SCSI-3	128k	$339	$389
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IBM	DCAS-34330W	8.5 Ms	5400	Ultra Wide SCSI-3	512k	$579	$619
Quantum	CY54335A	14Ms	3600	EIDE-4	128k	$259	$319
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Quantum	AL34550S	8 Ms	7200	Ultra SCSI-3	512k	$779	$829
Quantum	AL34550SW	8 Ms	7200	Ultra Wide SCSI-3	512k	$809	$859
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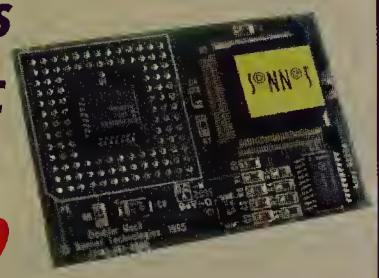

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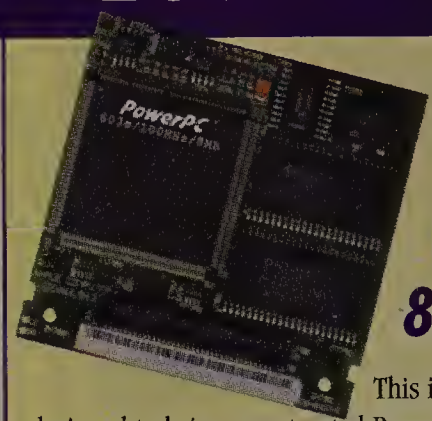

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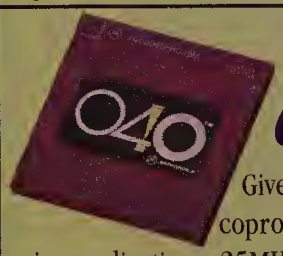

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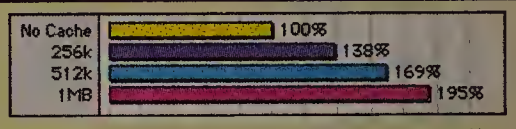

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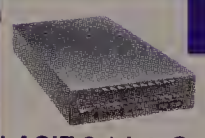

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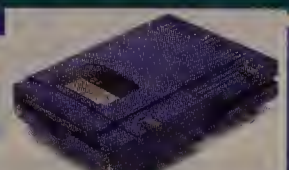

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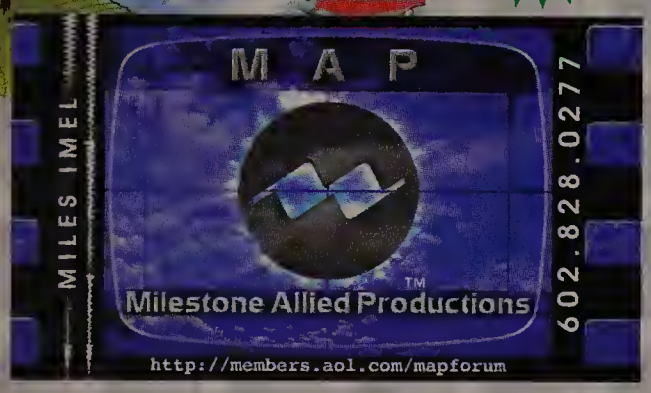

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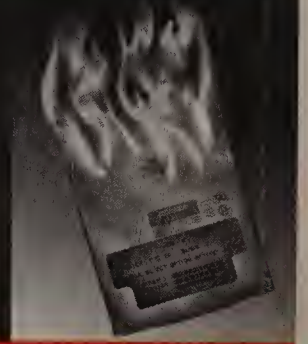

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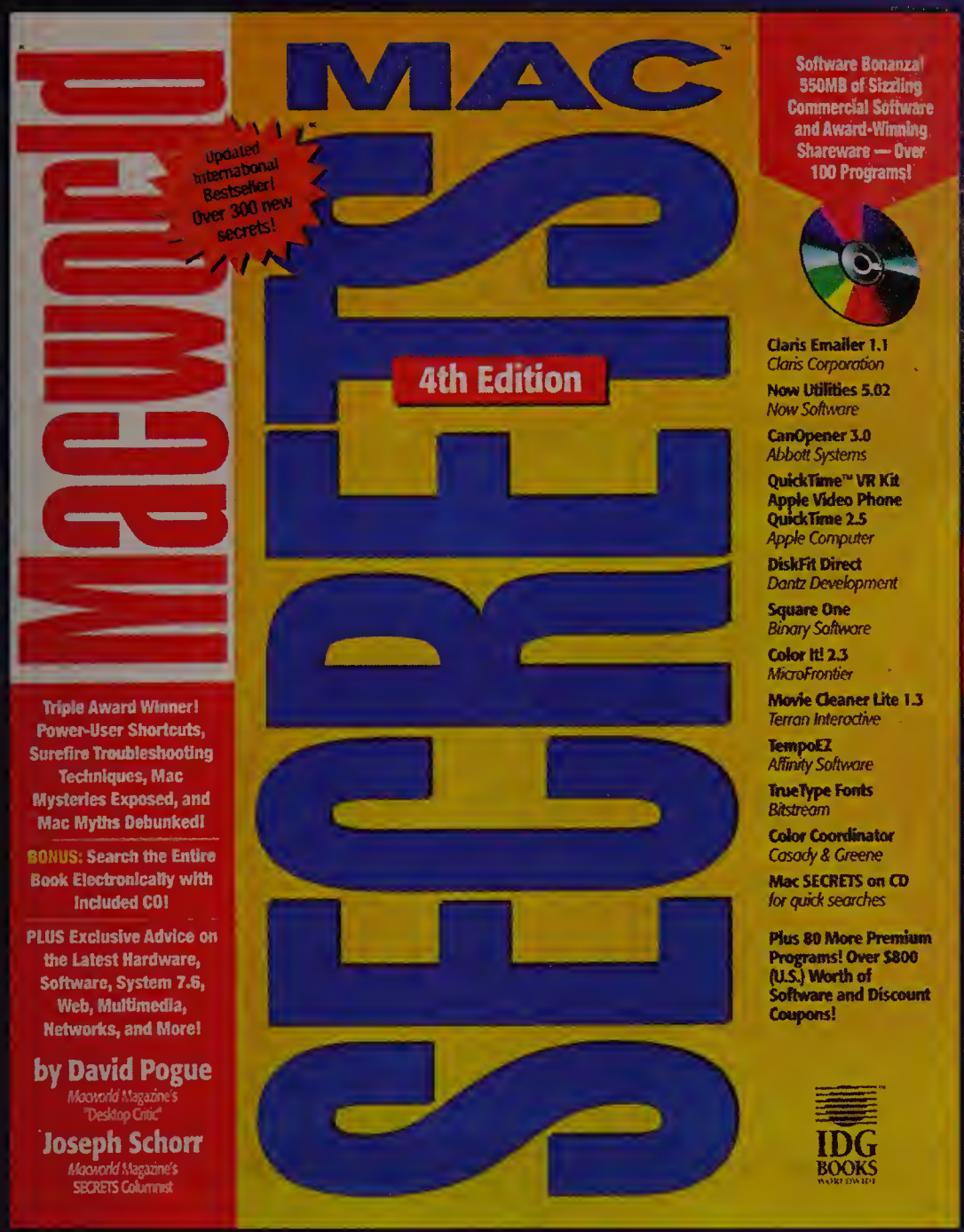

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continued from page 206
truth be told, it was actually dead long before that. After years of fiddling by a committee (uh-oh) drawn from IBM, Novell, Apple, and other companies, OpenDoc's *own* extensions took up a lot of RAM, and OpenDoc-based programs weren't exactly a model of stability. Meanwhile, Apple's OpenDoc collaborators had been losing their enthusiasm and dropping out of the party one by one. Perhaps it dawned on those companies that OpenDoc was great for consumers but lousy for software companies; OpenDoc would have ended the yummy stream of software-upgrade income forever.

The American Car Paradox

Ultimately, therefore, the answer to the upgrade problem lies with us. We're all alarmed by software bloat, sluggishness, and complexity, right? So why don't we, the masses, simply stop buying into the bloatware concept and let market forces do the rest? Why don't we just vote with our wallets, buying fast, small, focused software such as Mariner Write and Casady & Greene Spreadsheet 2000 instead of Word 6 and Microsoft "11-Megs-of-RAM" Excel?

Because we don't, that's why. May I present Upgrade Paradox #2: Small, fast, focused software programs don't sell. Time after time, software companies offer us antibloat products—and we don't buy them. Big Adobe Premiere thrives; little Video Fusion is dead. WordPerfect thrives, LetterPerfect is gone. ACI US's 4D is still on the market; 4D First isn't. Even Microsoft has gotten burned selling small, lean software once or twice—remember Microsoft Write? Me neither.

What's our deal, anyway? Why do we make best-sellers of the behemoths and flops of the focused? Why do we buy successive versions of our programs, even when we have no interest in the new features? Sure, sometimes we truly believe the next version will be an improvement. (And occasionally it really is.) And sometimes we upgrade out of fear of being orphaned.

But the most important factor in the Software Upgrade Paradoxes is more deeply seated, and explains both (a) why we keep buying upgrades and (b) why software companies respond by slathering on additional coats of code. It came to me, of all places, in *Consumer Reports*. The article said that *half* of all new cars sold in America are gigantic all-terrain sport-utility vehicles. Even scarier, *these* things are getting bigger every year, too.

These yuppie monster trucks are the 65-mph equivalents of Microsoft applications: they handle like oil tankers and guzzle gas like jumbo jets. Why are we buying them? Don't tell me it's just in case a flash flood washes out the road to the grocery store.

No, we buy them because we *like* unnecessary power. Surrounding ourselves with a mountain of artillery reassures and soothes us, even if it's power we don't understand. No, of *course* we won't use Web publishing, 3-D–modeling, and indexing features in our word processors. But isn't it nice knowing we're ready just in case?

So come on, Microsoft—bring it on and make it big! **m**

DAVID POGUE (*www.concentric.net/~pogue/*) isn't completely blameless in the Gigantic Upgrades department, having cowritten the 1200-page, 600MB best-seller Macworld Mac Secrets, fourth edition (IDG Books Worldwide, 1997).

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The Desktop Critic

by David Pogue

The Software-Upgrade Paradox

STOP THE MADNESS—OR JUST GIVE US BIGGER COMPUTERS

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I refer, of course, to software upgrades: the perennial herd of cash cows for the world's software companies. Software upgrades are big, big business; the software-company representatives I spoke to said that between 11 and 35 percent of their income comes from upgrade sales alone. My buddy Phil tracks this kind of thing; turns out he paid $900 for Adobe Photoshop when it first came out—and has paid out *$800* since, just to keep current with the upgrades.

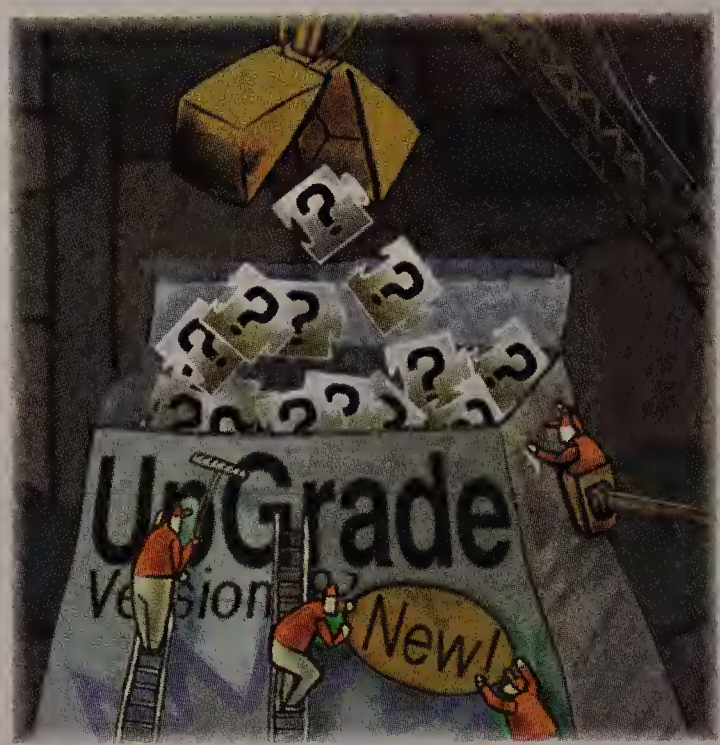
Still, the upgrade-cycle system has always worked well enough: software companies get that important revenue stream, and we keep getting cool new features. The trouble is, nobody's been looking ahead to see where this train is going. Now that some of our favorite programs are becoming richer, the end of the line is starting to become visible in the mist ahead. Simply put, if you improve a program too many times, you'll eventually ruin it.

That's the first Software Upgrade Paradox. Upgrading means adding features; but if a software company follows the Principle of Never-Ending Updates to its logical conclusion, it will sooner or later add features its customers don't actually need. At that point, the program has begun drifting from its original purpose—and has meanwhile become bigger, slower, and harder to figure out.

Microsoft Leads the Way

The most famous example of a wrecked masterpiece is Microsoft Word: Microsoft lost its nearly 100 percent word processor market-share lock with the gargantuan Word 6. This 25MB concoction neatly sliced the user base into two camps: those who upgraded to the newer, slower software, and those who stuck with the quick, reliable, extension-free Word 5.1. In fact, many Word fans were so angry about version 6 that Microsoft was forced to set an astonishing precedent, ripped right out of the New Coke–Classic Coke playbook: to this day, you can still buy the *older* version of Word, three years after Word 6's release.

Unfortunately, Microsoft is about to discover a bigger problem with the bigger-is-better syndrome—you can't go back again. Whatever else Word 7 offers when it's released, I'll guarantee you this much: it will take up even more disk space and RAM, it'll require more extensions, and its tool-bar–clogged screen will provide even less room for typing.



Microsoft isn't alone in facing the Upgrade Paradox, of course; the highway of progress is littered with overengineered program updates. Netscape Navigator 1.0, once good enough to grab 80 percent of the Web-browsing market, has mutated into Netscape Communicator: a 34MB megalith that moves at the speed of a slug and seeks to replace every program on your hard drive. Microsoft's own Internet Explorer is a fraction of Communicator's size; doesn't Netscape realize it's handing Microsoft market share on a stick? (On the other hand, maybe Netscape assumes that with a couple more upgrades, Explorer will become as top-heavy as any other Microsoft product.)

The latest versions of America Online, Deneba Canvas, Photoshop, and Macromedia Director and FreeHand aren't beyond hope, but they're taking their vitamins and not getting any smaller. About the only company that seems to have mastered the subtle art of upgrading is Claris: the last few upgrades to FileMaker, ClarisWorks, and Emailer have been works of art—*without* RAM or disk bloat. (Even sweeter, years pass between Claris upgrades.)

So where does it end? Are we destined to watch *every* non-Claris program, from Intuit Quicken to Myst, one day become a Netscape Communicator?

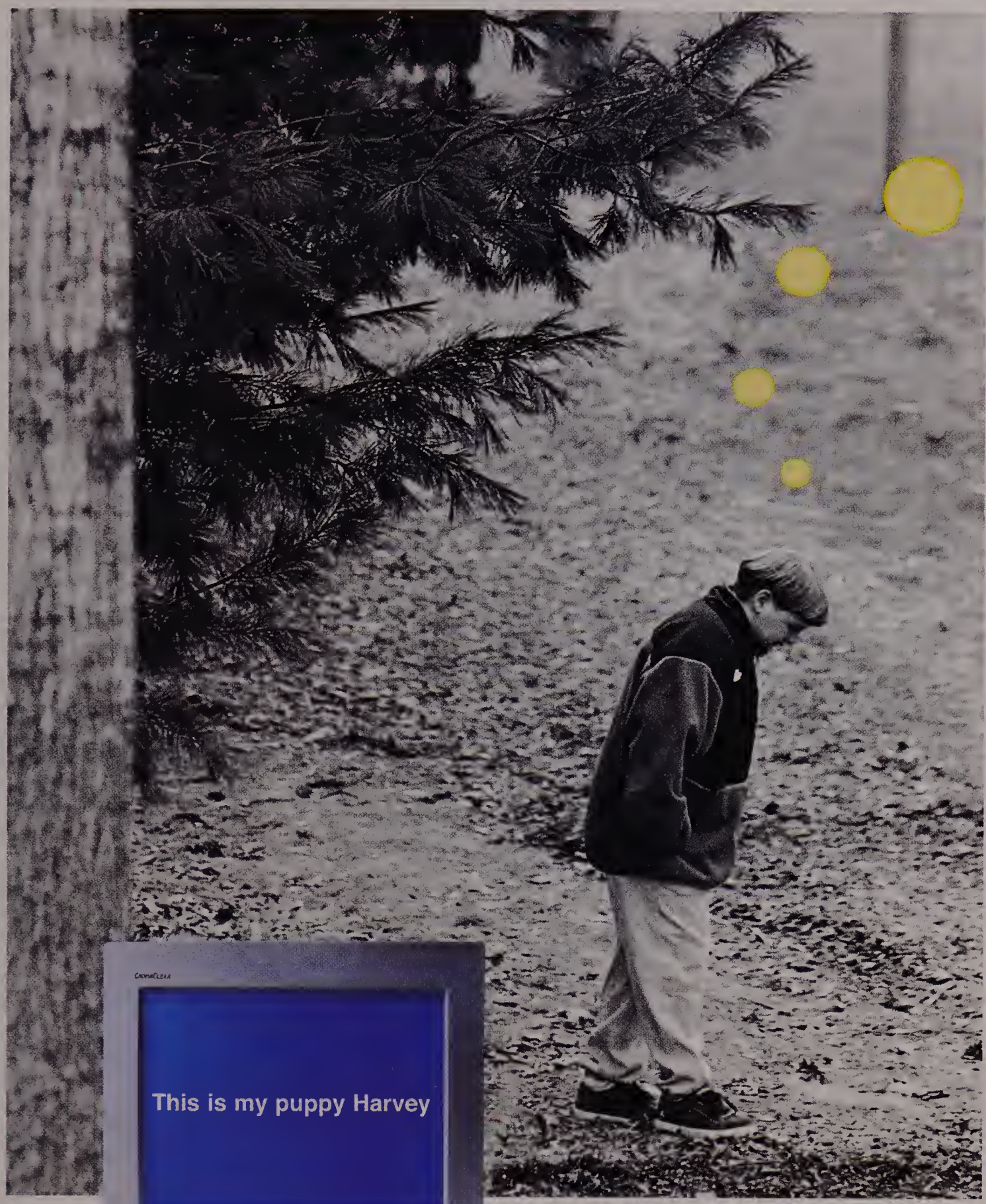
Means to an Ending

Actually, Apple has already solved the perpetual-upgrade problem. It invented the most intellectually satisfying answer to the Upgrade Paradox of all: a little piece of work known as OpenDoc. This ingenious technology was designed to let you buy *features*, not programs. You'd buy your favorite spelling checker, say, from Company A for $20, and install it into Company B's stripped-down $50 word processor. In this way, you'd get exactly the features you wanted, at a far lower dollar and resource cost.

OpenDoc was canceled during Apple's recent cost-cutting binge. But

continues on page 205

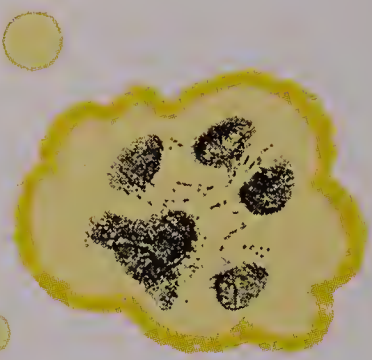
CHRIS CHING



1 THIS IS CHRISTIAN.

He can see, hear, feel, touch, but he cannot speak. He was born with autistic tendencies that cut him off from the world around him.

Until he found this window.



2 A TEACHER DISCOVERED *that Christian would respond to images from his life. She put visual cues to the story of his new puppy on a special keyboard.*

3 THE MONITOR BECAME HIS VOICE. *With it he makes class reports and conversation. With it, Christian, 11, has been in the regular Osterville, MA public school since first grade.*

4 WITH THE PICTURES, HE MADE SENTENCES. *With the sentences, he made friends. Christian's monitor is the window between his non-verbal world and the speaking world of his friends. Through it, he teaches them many things.*

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E500	1280 x 1024 @ 65Hz	119MHz	CROMACLEAR	0.25mm mask
E700	1600 x 1200 @ 65Hz	177MHz	CROMACLEAR	0.25mm mask
E1100	1600 x 1200 @ 65Hz	177MHz	Dot Trio	0.28mm dot

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Christian Murphy was non-verbal. He lived with a wall between himself and the world.

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